

2015 Dietary Guidelines Advisory Committee Meeting 4

Sponsored by the
U.S. Department of Health and Human Services (HHS)
U.S. Department of Agriculture (USDA)

July 17-18, 2014

Day 1 Meeting Summary

Thursday, July 17, 2014

(1:15 p.m.)

Participants

Dietary Guidelines Advisory Committee (DGAC): Dr. Barbara Millen (Chair), Dr. Alice H. Lichtenstein (Vice-Chair), Dr. Steven Abrams, Dr. Lucile Adams-Campbell, Dr. Cheryl Anderson, Dr. J. Thomas Brenna, Dr. Wayne Campbell, Dr. Steven Clinton, Dr. Frank Hu, Dr. Miriam Nelson, Dr. Marian Neuhouser, Dr. Rafael Pérez-Escamilla, Dr. Anna Maria Siega-Riz (*not present*), Dr. Mary Story

Co-Executive Secretaries: Dr. Richard Olson, Ms. Colette Rihane, Dr. Kellie O. Casavale, Dr. Shanthi Bowman

Others: Mr. Kevin Concannon, Dr. Don Wright, Ms. Angela Tagtow, Ms. Jackie Haven

Opening Remarks

Colette Rihane, Co-Executive Secretary and Director, Office of Nutrition Guidance and Analysis, Center for Nutrition Policy and Promotion, U.S. Department of Agriculture, (USDA), called the fourth meeting of the 2015 Dietary Guidelines Advisory Committee (DGAC) to order at 1:15 pm. Ms. Rihane welcomed the meeting participants and opened the meeting, noting that nearly 1,000 individuals were registered to view the webcast live. There were 13 members of the Committee present with the exception of Dr. Anna Maria Siega-Riz. She introduced the Co-Executive Secretaries and the other Federal staff at the table (listed above under participants).

Ms. Rihane reviewed the Committee's charge and the process of the Committee in preparing its report. She added that once its report is completed, HHS and USDA will develop the *Dietary Guidelines for Americans, 2015* based on the DGAC Report and consideration of public and Federal agency comments.

Ms. Rihane reviewed the agenda. Subcommittees would report this afternoon and tomorrow morning on their work since the last public meeting (March 14, 2014). She noted that in this public meeting, the Committee would discuss the scientific evidence and draft conclusion statements. She mentioned a new resource in the online notebook for this public meeting at www.DietaryGuidelines.gov that provides the literature lists that the Committee may refer to in its discussions.

In addition, she noted registrants for the meeting had the option to request that they receive the meeting slide presentations by email after the meeting, a new option that provides this information more efficiently to the public until they are available at www.DietaryGuidelines.gov after they have met the mandatory requirement to be “508 compliant.” The webcast recordings will also be accessible from this website within a few weeks after the meeting date.

Ms. Rihane added that the Committee requested that public comments be submitted as soon as possible. Information on public comments can be reviewed and submitted through www.DietaryGuidelines.gov. The next public meeting is tentatively scheduled for September 16 and 17, 2014. She then turned the floor over to Dr. Barbara Millen.

Introduction to Subcommittee Reports

Dr. Barbara Millen, Chair of the DGAC, began by describing that the presentations from each of the five topic area subcommittees would provide an update of the work to the Committee since the last meeting on March 14, 2014. She reiterated the purpose and the charge of the Committee and provided background information on the systematic process to review the scientific evidence.

Dr. Millen reviewed a draft conceptual model the Committee is developing to describe the dynamic factors that impact nutrition- and physical activity-related lifestyle and health issues. The model suggests that the complex influences and determinants of diet and physical activity lifestyle choices include the interpersonal and intrapersonal, environmental, sectors, settings, and systems levels of influence. The model will link these determinants to health outcomes, including the nutritional status of the population and major causes of morbidity and mortality. It takes into account the settings in which interventions may take place, such as through health care and public health settings, and in the community through public-private partnerships. Understanding the complexity of these conditions and relationships between determinants and outcomes will shape the subcommittees’ recommendations.

Dr. Millen reviewed the scope of each of the five subcommittees, noting that the presentations to follow will describe the work of each subcommittee as well as work on several topics that cross two or more subcommittees. Dr. Millen described that two types of expertise may be sought by the Committee, invited experts and consultant subcommittee members. Invited experts are individuals invited by a subcommittee, usually on a one-time basis, to provide their expertise to inform the subcommittee’s work; they do not participate in decisions at the subcommittee level.

Consultant subcommittee members are individuals sought to participate in subcommittee discussions and decisions on an ongoing basis but are not members of the full Committee. Like Committee members, consultants complete training and have been reviewed and cleared through a formal process within the Federal government.

To set the stage for the subcommittee reports, Dr. Millen reviewed the approaches for examining the evidence that are common to all the subcommittees. This includes use of Nutrition Evidence Library (NEL) systematic reviews, existing high-quality reports, data analyses, and food pattern modeling analyses, as well as consideration of public comments. She then reviewed the six steps of the NEL process managed by USDA; these steps were presented in detail at the inaugural meeting of the Committee in June 2013. She noted that the NEL process is elaborate, objective, and systematic. She introduced the types of materials the subcommittees might use in presenting its reviews of the evidence for the full Committee's consideration and described the purpose of conclusion and implications statements. She then turned the floor over to the subcommittee Chairs, noting they would provide their reports in the order of Subcommittee 2 followed by 4, 1, 5, and then 3.

Subcommittee 2 (SC 2): Dietary Patterns, Foods and Nutrients, and Health Outcomes

Dr. Alice H. Lichtenstein, Committee Vice-Chair, began the presentation on behalf of Dr. Anna Maria Siega-Riz, SC 2 Chair, by acknowledging the support of the other SC 2 members, Dr. Cheryl Anderson, Dr. Tom Brenna, Dr. Steven Clinton, Dr. Frank Hu, Dr. Marian Neuhouser, and Dr. Rafael Pérez-Escamilla. She described the scope of SC 2, which is to examine the relationship between dietary patterns, foods, and nutrients and mortality and preventable diet-related diseases like obesity. The primary focus is to consider foods and nutrients in the context of dietary patterns, but in some cases consider targeted questions for specific foods and nutrients when needed. Dr. Lichtenstein noted that SC 2 did not receive input from any invited experts or consultants between March and July 2014.

Dr. Lichtenstein outlined the four topics that would be covered during the presentation: Dietary patterns and 1) cardiovascular disease (CVD), 2) Body weight/obesity, 3) Type 2 diabetes (T2D), and 4) Cancer. She then turned the presentation over to SC 2 member, Dr. Hu.

Dietary Patterns and CVD, Body Weight/Obesity, and T2D

Dr. Hu identified the first series of questions to be addressed by SC 2: "What is the relationship between dietary patterns and risk of CVD, measures of body weight/ obesity, and risk of T2D?" These questions were answered using existing reports. Additional systematic reviews and meta-analyses published after the searches in these existing reports were conducted were also included.

Dr. Hu began with dietary patterns and CVD. He noted that the definition of CVD is relatively broad and includes both hard endpoints (e.g., myocardial infarction and stroke) as well as

intermediate endpoints (e.g., blood lipids and blood pressure). Dr. Hu reviewed the sources of evidence and presented the subcommittee's draft conclusion statement. The Committee concurs with the conclusions of the NEL Dietary Patterns Systematic Review and AHA/ACC Guideline that strong and consistent evidence demonstrates that dietary patterns associated with decreased risk of CVD are characterized by regular consumption of fruits, vegetables, whole grains, low-fat dairy, and fish, and are low in red and processed meat, refined grains, and sugar-sweetened foods and drinks. Dietary patterns that include regular consumption of nuts and legumes and moderate consumption of alcohol also are shown to be beneficial in most studies. Additionally, research that includes specific nutrients in their description of dietary patterns indicate that patterns that are low in saturated fat, cholesterol, and sodium, and rich in fiber, potassium, and unsaturated fats are beneficial for reducing cardiovascular disease risk. In terms of implications, Dr. Hu noted that multiple dietary patterns are beneficial for cardiovascular health, and that they can be tailored to individual needs and food and cultural preferences.

Dr. Hu next reviewed the sources of evidence and presented the draft conclusion statement for dietary patterns and measures of body weight/obesity. The Committee concurs with the NEL Dietary Patterns Systematic Review that moderate evidence suggests favorable outcomes related to healthy body weight (including lower body mass index (BMI), waist circumference, or percent body fat) or risk of obesity with dietary patterns that are high in fruits, vegetables, and whole grains; include fish and legumes; are moderate in dairy products, particularly low-fat dairy, and alcohol; and are low in meats, particularly red and processed meats. Nutrients that are components of the dietary patterns associated with these favorable outcomes included high intakes of unsaturated fats and low intakes of saturated fats, cholesterol, and sodium. The Committee concurs with the 2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity that strong evidence demonstrates that, preferably as part of a comprehensive lifestyle intervention, overweight and obese adults can achieve weight loss through a variety of dietary patterns that reduce food and calories and achieve an energy deficit. Dr. Hu presented draft implications for dietary patterns and body weight. He remarked that an energy deficit is necessary to achieve weight loss but that this can be achieved through a variety of evidence-based dietary patterns and approaches. Strategies should be based on an individual's preference and health status and would preferably include a referral to a nutrition professional for counseling.

Lastly, Dr. Hu reviewed the sources of evidence and presented the draft conclusion and implication statements for dietary patterns and T2D. Moderate evidence suggests that dietary patterns rich in fruits, vegetables, and whole grains and low in red and processed meats, high-fat dairy, refined grains, and sweets/sugar-sweetened beverages reduce the risk of developing T2D. Evidence is lacking for the pediatric population.

Discussion

Dr. Story noted that there was no mention of refined grains or sugar-sweetened foods and beverages in the draft conclusion statement for dietary patterns and body weight. Dr. Hu indicated that this was a result of the wide variation in how dietary patterns were defined in the literature. The dietary components identified in the draft conclusion statement were consistent

across multiple studies. The fact that refined grains and sugar-sweetened foods and beverages were not included does not mean they are not important but rather that the number of studies that included them was not sufficient to draw a conclusion.

Dr. Neuhouser asked Dr. Hu to talk more about the measures of body weight in the T2D papers, whether they were measured or self-reported, and whether body weight mediates the relationship between dietary patterns and T2D. Dr. Hu indicated that a mix of measured and self-reported body weight variables was included in the evidence portfolio, and there appeared to be no appreciable differences in terms of the relationship with dietary patterns. Regarding the question about whether body weight is a mediator, he noted that not all of the studies addressed this question. In the NEL Dietary Patterns Systematic Review Project, almost all of the studies on T2D controlled for baseline BMI so the conclusion derived from the NEL report suggests that the relationship between dietary patterns and T2D was independent of baseline body weight, though it is possible that weight change over time may mediate the association between dietary patterns and risk of T2D. Dr. Neuhouser noted that it is important to consider the role of weight gain and whether weight is in the causal pathway or whether it is a mediator or confounder; this could be a recommendation for future research.

Dr. Adams-Campbell asked if the dietary patterns associated with specific health outcomes were consistent across ethnic groups, gender, or geography. Dr. Hu noted that the vast majority of cohort studies included in the evidence were conducted in the U.S. or in European populations. While some of these cohorts did include ethnic minorities, the NEL report did not specifically describe differences across these groups. Dr. Hu noted that several publications from the Black Women's Health Study looked at the relationship between dietary patterns and a range of health outcomes, and the results were fairly consistent with cohorts that included primarily Caucasian populations.

Dr. Millen asked Dr. Hu to talk more about how multiple dietary patterns can achieve positive health outcomes. Dr. Hu agreed that there is no one optimal diet for chronic disease prevention. This conclusion has significant public health and clinical implications because it provides flexibility and many options for the public to develop healthy eating habits. The dietary pattern literature suggests that the most important factor in determining risk of a wide range of chronic disease outcomes is overall diet quality.

Dr. Pérez-Escamilla noted that in the draft conclusion statement for dietary patterns and T2D, it was stated that evidence is lacking for the pediatric population. This is important when trying to come up with dietary pattern recommendations that apply to the pediatric population. He asked Dr. Hu to restate what is known about dietary patterns and risk of CVD, along with weight control, in the pediatric population. Dr. Hu stated that there has not been much dietary pattern analysis among children in the observational literature, and in terms of interventions targeting pediatric obesity prevention, there have been a number of approaches studied but none specifically related to dietary patterns. He agreed with Dr. Pérez-Escamilla that this is an important question and that there has to be a different approach when making recommendations for children.

Dr. Nelson commented that one of the most exciting aspects of the dietary patterns analyses is the commonality across patterns associated with reduced risk for multiple health outcomes. Due to the substantial overlap, she wondered if there would be a single implication statement that would apply to CVD, body weight, and T2D. Dr. Lichtenstein mentioned that this is being considered by SC 2.

Dr. Nelson also noted that a diet low in cholesterol was one of the elements in the dietary pattern associated with a reduced risk for CVD and asked Dr. Hu to speak more about this relationship. Dr. Hu clarified that while cholesterol is one of the attributes of the dietary pattern associated with CVD risk reduction, this doesn't mean that the individual component is necessarily responsible for the effect.

Dr. Story asked if the subcommittee found any major differences in the current evidence compared to the evidence reviewed for the 2010 *Dietary Guidelines*. She also noted that SC 2 found strong evidence to support a dietary pattern low in saturated fat and asked if Dr. Hu could comment on how this differs from recent statements in the media. Dr. Hu stated that the body of literature has grown significantly since 2010. He specifically noted the contribution of the AHA/ACC Guidelines, which reviewed hundreds of studies and clinical trials. In terms of saturated fat, none of the dietary patterns associated with positive health outcomes included high intakes of saturated fat, red meat, or added sugars. This evidence provides a compelling reason to adopt a diet low in saturated fat and added sugars. Dr. Lichtenstein also commented on the recent meta-analysis that received media attention for *not* finding a relationship between saturated fat and CVD risk, because it highlights the difference in focusing on a dietary pattern versus an individual nutrient. The meta-analysis did not distinguish between studies that used different macronutrients to replace saturated fat. This has substantial impact considering that replacement of saturated fat by carbohydrates tends to have a null effect on CVD risk, whereas replacement of saturated fat with polyunsaturated fatty acids has a positive effect.

Dr. Campbell asked Dr. Hu about the consistency of descriptors found in the various dietary patterns (e.g., high-intake, includes, etc.) and if the Committee could come to some agreement on word choices used across patterns. Dr. Hu agreed that there should be consistency, though the conclusions are constrained to some extent by the wording used in the individual studies. Dr. Hu mentioned a current effort in SC 1 that aims to quantify specific amounts of the food components included in the prevailing dietary patterns and that this effort will hopefully allow SC 2 to be more precise. Dr. Lichtenstein also commented that dietary pattern recommendations need to be considered in terms of overall calorie intake.

Dr. Campbell's second question pertained to the draft conclusion and implication statements related to animal-based foods, specifically red meat. He asked Dr. Hu to share his perspective on why red meat as a whole should be limited. Dr. Hu acknowledged that SC 2 did not look specifically at red meat vs. processed meat vs. fish or other types of meat because the subcommittee was focusing on dietary patterns, not individual components. When dietary pattern analyses are conducted in observational studies, certain foods tend to cluster together and conclusions can only be made about the dietary patterns as a whole. The contribution of risk from a particular food component cannot be teased out. Dr. Lichtenstein also noted that SC 2 was

constrained by the RCT literature. In interventions that compare typical “Western” diets to “healthy” diets, red and processed meats tend to be reduced simultaneously.

Dietary Patterns and Cancer

Dr. Steve Clinton presented on the topic of dietary patterns and cancer. The question for this topic is: “What are the relationships between dietary patterns and the risk of the most common cancers (breast, colorectal, prostate, and lung cancer)?” Dr. Clinton began with an overview of the subcommittee’s strategy. SC 2 focused their efforts on cancers with the greatest public health impact. Breast, colorectal, prostate, and lung cancer account for over 50 percent of all non-skin cancers in Americans. The relationship between dietary patterns and cancer was examined using NEL systematic reviews, but the subcommittee plans to enhance this effort using existing reports and emerging data (including reports from the World Cancer Research Fund/American Institute for Cancer Research and World Health Organization/International Agency for Research on Cancer) to evaluate the contribution of individual foods and nutrients more specifically.

Dr. Clinton reviewed the analytical framework, inclusion and exclusion criteria for the literature search, the literature search results, and a description of the evidence for each question. He also noted a few general observations and recommendations for future research. Despite the expanding number of available studies regarding dietary patterns and cancer risk, the portfolio of quality studies remains modest and employs a wide range of methodology in study design, dietary pattern assessment, and statistical approaches.

Dr. Clinton presented draft key findings and draft conclusion statements for each of the four cancers. For breast cancer, moderate evidence suggests that dietary patterns rich in fruits, vegetables, and whole grains and low in some animal products and refined carbohydrate are associated with reduced risk of post-menopausal breast cancer. The data regarding this dietary pattern and pre-menopausal breast cancer risk points in the same direction, but the evidence is limited due to fewer studies. For colorectal cancer, moderate evidence suggests an inverse association between colorectal cancer risk and dietary patterns that are high in fruits, vegetables, legumes, whole grains, lean meats/seafood, and low-fat dairy; moderate in alcohol; and low in red and/or processed meats, saturated fat, and sodas/sweets. In contrast, greater colorectal cancer risk is associated with diets that are high in red/processed meats, French fries/potatoes, and sources of sugars (i.e., sodas, sweets, and dessert foods).

Dr. Clinton noted that fewer articles were available to evaluate the relationship between dietary patterns and risk of prostate and lung cancer. No conclusion can be drawn regarding this relationship for prostate cancer due to limited evidence from a small number of studies with wide variation in study design, dietary assessment methodology, and cancer outcome ascertainment. For lung cancer, limited evidence suggests a lower risk is associated with diets containing more frequent servings of vegetables, fruits, fish, lean meats, grains/cereals, legumes, and low-fat milk.

Dr. Clinton noted that implications for dietary patterns and cancer will be determined based upon an integration of conclusions from the reviews of dietary patterns as well as the food and nutrient evaluation.

Discussion

Dr. Nelson noted that there appears to be no major disagreements between the dietary patterns and health outcomes, which is reassuring. She also noted that grains/cereals were mentioned in the dietary pattern associated with a reduced risk for lung cancer and asked if these were whole grains. Dr. Clinton echoed Dr. Hu's previous comment that they are limited by the terminology that the investigators use to define their patterns and that this was how the dietary component was described in the literature.

Dr. Campbell asked Dr. Clinton to comment on the relationship between the timing of dietary pattern consumption and cancer onset. Dr. Clinton said that this varies by cancer. For breast cancer, it is clear that certain events in a woman's life impact her risk, so it is reasonable to hypothesize that dietary patterns consumed during different stages of life may impact the breast in various ways. He hypothesized that the same could be true for lung cancer and emphasized the need for a better way of assessing diet across the lifespan to determine impact of diet during particular phases of life.

Dr. Hu asked if any of the studies had looked at total cancer incidence or mortality and whether this would be relevant. Dr. Clinton said that SC 2 has discussed looking at total cancer incidence as an outcome, and that this is still of interest to them. The subcommittee will discuss the topic on a future call.

Dr. Anderson acknowledged the many challenges around case ascertainment and exposure assessment and asked if there might be ways to improve exposure assessment, such as through biomarkers, to get a better understanding of etiology. Dr. Clinton emphasized that the focus of this subcommittee has been to look at dietary patterns and cancer risk using the tools that are available. He agreed that better biomarkers as valid measures of exposure linked to health outcomes would be a significant advancement in public health. Dr. Neuhouser also agreed and commented that there is a tremendous research need for longitudinal studies that collect biological sampling, measures of weight and weight change, and dietary data over time.

Dr. Hu asked if diet and cancer risk are more strongly linked for colorectal cancer than for other cancers. Dr. Clinton agreed that, for now, colorectal cancer has the strongest accumulated evidence for a diet and nutritional link.

Subcommittee 2, Continued

Dr. Lichtenstein concluded the SC 2 presentation with a summary of next steps. The subcommittee will be addressing questions related to dietary patterns and birth defects, neurological and psychological illnesses, and bone health. SC 2 will then look across the dietary

patterns evidence and describe common elements that are associated with health. In addition, SC 2 is addressing questions pertaining to sodium, saturated fat, and added sugars and will have invited experts on the microbiome, which is an “emerging” topic.

Subcommittee 4 (SC 4): Food and Physical Activity Environments

Dr. Mary Story, SC 4 Chair, began the presentation by recognizing the other SC 4 members, Dr. Lucile Adams-Campbell, Dr. Wayne Campbell, Dr. Miriam Nelson, and Dr. Barbara Millen. She provided an overview of the work that SC 4 conducted between the March and July Committee meetings, noting that SC 4 would be discussing evidence on three topics: 1) Food access; 2) Early care and education (ECE); and 3) Schools. Dr. Story then reviewed the scope for SC 4, which is looking at key settings such as neighborhood and community food access, food retail, schools and ECE as well as the macro environment, including food marketing. SC 4 is also interested in understanding and assessing the role of the food environment in promoting or hindering healthy eating and identifying the most effective diet-related approaches and policies (“what works”) to improve health and reduce disparities. Dr. Story identified the experts that SC 4 had invited to present on specific topics (listed below), and stated that SC 4 does not have any consultant members. She then turned the presentation over to SC 4 member, Dr. Nelson.

Invited Experts

Dr. Susan Krebs-Smith, National Cancer Institute, National Institutes for Health

Dr. Jill Reedy, National Cancer Institute, National Institutes for Health

Food Access

Dr. Nelson discussed SC 4’s work on the food access topic area. She began by stating that criterion established by the Economic Research Service (ERS) of USDA is being used to define food accessibility. Current questions of interest are focused on the relationship between neighborhood/community food access in food retail settings and the dietary intake, quality, and weight status of individuals and were examined using NEL systematic reviews. Dr. Nelson reviewed the analytical framework, inclusion and exclusion criteria for the literature search, the literature search results, and the description of the evidence. Dr. Nelson presented draft key findings and then draft conclusion statements that: 1) “Limited but consistent evidence indicates that the relationship between access to farmers’ markets/produce stands and dietary intake and quality is favorable” (DGAC grade: Limited due to small number of studies). She noted that “a limited body of evidence shows conflicting results regarding access to other food outlets, such as supermarkets, grocery stores, and convenience stores and dietary intake and quality;” and 2) “Limited but consistent evidence indicates that the relationship between access to convenience stores and weight status is unfavorable with closer proximity and greater access being associated with significantly higher BMI and/or increased odds of overweight/obesity” (DGAC grade: Limited due to a small number of studies). “A limited body of evidence shows conflicting results

regarding access to other food outlets, such as supermarket, grocery stores and farmers' markets/produce stands, and weight status." Dr. Nelson turned the presentation over to Dr. Story.

Discussion

Dr. Lichtenstein asked if there were data that could be gleaned about the hours that certain food outlets are open and how this might affect dietary intake or weight status. Dr. Nelson responded there is not currently any evidence on this topic. She stated that food access is multi-dimensional; in addition to hours of operation, transportation, location, and shopping behaviors also have to be considered. SC 4 will likely include some research recommendations within this area, noting the Healthy Eating Index (HEI) is one way to look at the full complement of access to healthful and less healthful foods within a venue or community.

Dr. Pérez-Escamilla highlighted the importance of incentives to motivate individuals to make healthier choices, noting that cultural preferences are very important when considering what incentives might work best with various populations. Dr. Nelson responded that SC 4 will consider issues such as cultural preferences when developing implications statements. She added that communities should strive to provide access to healthy, affordable, and culturally appropriate foods. Dr. Millen agreed with the points made about incentivizing changes within the food environment. She also noted that the HEI could be used to connect the environment to health outcomes. Dr. Nelson responded that the HEI could be applied to communities to evaluate diets and health outcomes, and that research recommendations are forthcoming. Dr. Lichtenstein noted that the government also has a role to play in incentivizing changes within the food environment; for example, the proposed changes to the Nutrition Facts panel and technology can provide information and motivate consumers make healthier choices. Dr. Nelson agreed.

Dr. Neuhouser noted that incentives for suppliers, manufacturers, and growers all need to come together to support the goal of achieving a healthier food environment. Dr. Nelson agreed.

Early Care and Education

Dr. Story presented findings on the early care and education (ECE) topic area. She began by stating the question that was evaluated: "What is the impact of obesity prevention approaches in ECE programs on the weight status of children two to five years of age?" Dr. Story explained that the question was addressed using an existing systematic review, which was updated with a NEL systematic review. Dr. Story reviewed the analytical framework, inclusion and exclusion criteria for the literature search, the literature search results, and the description of the evidence. She presented draft key findings followed by draft conclusion statements that "moderate evidence suggests that multi-component obesity prevention approaches implemented in child care settings improve adiposity-related outcomes in preschoolers. A combination of dietary and physical activity interventions is most effective for preventing or slowing excess weight gain and reducing the proportion of overweight and obese preschoolers" (DGAC grade: Moderate).

Discussion

Dr. Pérez-Escamilla asked if there was enough detail in the evidence to extract information about how the interventions were implemented. Dr. Story responded that with multi-component interventions the keys were a combination of dietary interventions along with physical activity. Specific to diet, some interventions focused on increasing fruits and vegetables, while others focused on decreasing consumption of sugar-sweetened beverages. It is promising that these interventions that ranged in duration did have some impact on weight outcomes. Dr. Nelson added that SC 4 could do more to describe the range of interventions that were implemented in the studies that were reviewed. Dr. Anderson added that intensity is an important component to consider because what might work in a controlled environment at a lower intensity might need to be scaled if it were to be implemented under other conditions. Dr. Story added that many of the studies were conducted in lower-income neighborhoods.

Dr. Pérez-Escamilla asked if there was any information that could inform dietary patterns for children. Dr. Story responded that this could be evaluated.

Dr. Hu asked if there was any information provided about sleep patterns. Dr. Story stated that none of the studies included sleep and that this could be a research recommendation.

Dr. Lichtenstein asked if the studies included any follow-up into kindergarten. Dr. Story stated that they did not and that this could be another research recommendation.

Dr. Millen suggested that as SC 4 looks further into the interventions to see if information about dietary patterns is available that the conclusion statement could be modified to state that a variety of multi-component interventions can work within these environments. Dr. Story agreed.

School Environment

Dr. Campbell discussed the questions under review related to approaches and policies within the school environment and their impact on dietary intake and quality and weight: 1) What is the impact of school-based approaches on the dietary intake, quality, behaviors and/or preferences of school-aged children?; 2) What is the impact of school-based policies on the dietary intake, quality, behaviors and/or preferences of school-aged children?; 3) What is the impact of school-based approaches on the weight status of school-aged children?; and 4) What is the impact of school-based policies on the weight status of school-aged children? Dr. Campbell noted that these questions will be addressed using existing systematic reviews.

Dr. Campbell reviewed the analytical framework, search strategy, and inclusion and exclusion criteria for the reviews. After the literature search and consideration of the criteria, the final number of existing reviews for school-based approaches and dietary intake and weight included three and two reviews, respectively, and the final number of existing reviews for school-based policies and dietary intake and weight included two reviews for each. Dr. Campbell handed the presentation over to Dr. Story.

Dr. Story stated the SC 4 is moving forward to draft implications statements and research recommendations for the food access and early care and education topic areas. SC 4 will also be working on draft conclusion and implications statements and research recommendations for the schools topic area. A review of worksite settings is forthcoming, along with a review of policies and environmental strategies that can promote recommended intake of sodium.

Meeting Recessed

Recessed (4:03 p.m.)

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Day 2 Meeting Summary

Friday, July 18, 2014

(8:00 a.m.)

Participants

Dietary Guidelines Advisory Committee (DGAC): Dr. Barbara Millen (Chair), Dr. Alice H. Lichtenstein (Vice-Chair), Dr. Steven Abrams, Dr. Lucile Adams-Campbell, Dr. Cheryl Anderson, Dr. J. Thomas Brenna, Dr. Wayne Campbell, Dr. Steven Clinton, Dr. Frank Hu, Dr. Miriam Nelson, Dr. Marian Neuhouser, Dr. Rafael Pérez-Escamilla, Dr. Anna Maria Siega-Riz (*not present*), Dr. Mary Story

Co-Executive Secretaries: Dr. Richard Olson, Ms. Colette Rihane, Dr. Kellie O. Casavale, Dr. Shanthy Bowman

Others: Dr. Don Wright, Ms. Angela Tagtow, Ms. Jackie Haven

Opening Remarks

Dr. Richard Olson, Designated Federal Officer, Division of Prevention Science, Office of Disease Prevention and Health Promotion. U.S. Department of Health and Human Services, called the second day of the fourth meeting of the 2015 Dietary Guidelines Advisory Committee to order at 8:00 am. Dr. Olson welcomed the meeting participants. He reviewed that the agenda would include reports of the subcommittees' work as well as the Physical Activity Writing Group (PAWG) activity. He noted the Committee would have discussion of the scientific evidence and draft conclusions during this public meeting. Dr. Olson noted that all the Committee members were present except for Dr. Anna Maria Siega-Riz.

He apologized in advance for the delay in posting the presentations on www.DietaryGuidelines.gov for the public, noting the delay is due to the requirement that all materials must first be "508 compliant."

Dr. Olson reviewed that it is expected that the Committee will complete its report by the end of calendar year 2014. The Departments will post the report for public comment, hold a public comment meeting on the report, and then develop the policy document, the *Dietary Guidelines for Americans*, 2015. The policy document is expected to be published by the end of calendar year 2015. He then turned the floor over to Dr. Marian Neuhouser.

Subcommittee Presentations and Discussion

Subcommittee 1 (SC 1): Food and Nutrient Intakes, and Health: Current Status and Trends

Dr. Marian Neuhouser, SC 1 Chair, identified the members of SC 1, who are Dr. Steven Abrams, Dr. Cheryl Anderson, Dr. Mary Story, and Dr. Alice H. Lichtenstein. She also acknowledged Dr. Barbara Millen as an active member working with SC 1. She described the scope of the SC 1 work as identifying the current status and trends in: 1) Food group, food, and nutrient intake; 2) Eating behaviors; 3) Diet-related chronic diseases, weight, and physical activity; and (4) Dietary patterns. She explained that this work is a necessary foundation for the overall Committee report to understand where the population is and to formulate appropriate recommendations. She noted that SC 1 had no invited experts or consultants since the March meeting.

Dr. Neuhouser noted that the SC would address the current status of their work on five topics today: Nutrients of Public Health Concern, Food Group Intakes, Food Category Intakes, Eating Behaviors—Status and Trends, and Health Conditions—Prevalence and Trends.

Nutrients of Public Health Concern

Dr. Neuhouser then identified the specific questions she would address for the topic “Nutrients of Public Health Concern,” which are: 1) “What are current consumption patterns of nutrients from foods and beverages in the U.S. population?;” 2) Of the nutrients that are over- or under-consumed, which present a substantial public health concern?;” 3) Is there evidence of overconsumption of any micronutrients from consumption of fortified foods and supplements?;” 4) What is the level of caffeine intake derived from foods and beverages by age/sex categories in the U.S. population?;” 5) How well do updated USDA Food Patterns meet Institute of Medicine (IOM) Dietary Reference Intakes (DRI) and 2010 *Dietary Guidelines* recommendations?;” and 6) How do the recommended amounts of food groups compare to current distributions of usual intakes for the U.S. population?;”

Dr. Neuhouser began with the first question on current consumption patterns of nutrients from foods and beverages in the U.S. population. She noted that they answered this question with data

analysis using What We Eat in America (WWEIA), the dietary component of the National Health and Nutrition Examination Survey (NHANES) for 2007-2010. She briefly summarized the information presented in March on nutrient intakes and presented draft conclusion statements that 1) “Vitamin A, vitamin D, vitamin E, folate, vitamin C, calcium, and magnesium are under-consumed relative to the Estimated Average Requirement (EAR), and iron is under-consumed by adolescent and premenopausal females;” 2) “Potassium and fiber are under-consumed relative to the Adequate Intake (AI);” and 3) “Sodium and saturated fat are over-consumed relative to the Upper Limit (UL) or other maximum standard.”

Dr. Neuhouser next discussed the second question: “Of the nutrients that are over- or under-consumed, which present a substantial public health concern?” For this question, SC 1 again used WWEIA, NHANES data. In addition, the Second National Report on Biochemical Indices of Diet and Nutrition in the U.S. Population and data on the prevalence of health conditions, both from the Centers for Diseases Control and Prevention (CDC), supported evidence for this question. She briefly summarized the information presented in March on nutrients of public health concern and presented draft conclusion statements that 1) “Nutrient intake data, together with nutritional biomarker and health outcome data, indicate that vitamin D, calcium, potassium, and fiber are under-consumed and may pose a public health concern;” and 2) “Nutrient intake data, together with nutritional biomarker and health outcome data, indicate that sodium and saturated fat are over-consumed and may pose a public health concern.”

Dr. Abrams discussed the third question: “Is there evidence of overconsumption of any micronutrients from consumption of fortified foods and supplements?” SC 1 used an analysis of usual intake data for selected nutrients from foods and supplements from WWEIA, NHANES (2007-2010) to answer this question. He described the key findings from this analysis and presented the draft conclusion statement that 1) “Dietary patterns in the U.S. population, including typical use of fortified foods, rarely lead to over-consumption of folate, calcium, iron, and vitamin D;” and 2) “However, each of these, as well as other nutrients, may be over-consumed in some supplement users, especially those taking high-dose supplements.”

Dr. Abrams then presented the fourth question: “What is the level of caffeine intake derived from foods and beverages on the basis of age and gender groups in the U.S. population?” This question was also answered using analysis of usual intake data from WWEIA, NHANES (2007-2010). He briefly summarized the key findings, which were previously presented in March, and presented the draft conclusion statement that 1) “In general, intakes of caffeine did not exceed what are likely safe levels in any age group. Some young adults may have moderately high intakes;” and 2) “There is less certainty about the safe level of intake in children and adolescents. However, routine consumption patterns do not suggest that excessive intakes are common in these groups.”

Dr. Abrams then presented the fifth question: “How well do updated USDA Food Patterns meet IOM DRIs and 2010 *Dietary Guidelines* recommendations? How do the recommended amounts of food groups compare to current distributions of usual intakes for the U.S. population?” These

questions were addressed using the results of the Food Pattern Modeling Report on Adequacy of the USDA Food Patterns. He noted that the USDA Food Patterns identify amounts to consume in nutrient-dense forms from five major food groups and their subgroups at 12 calorie levels. Recommended amounts differ across the calorie levels, each specific to one or more age/gender groups. To assess adequacy, nutrients in each pattern were compared to nutrient standards for the age/gender group assigned to that pattern. He summarized the key findings from the report, documenting that amounts in the patterns of most nutrients exceed 100 percent of the Recommended Dietary Allowance (RDA) or AI, though amounts of a few nutrients were less than the applicable standard. He then presented the draft conclusion statement that 1) “USDA Food Patterns across a broad range of ages and energy intakes meet most goals for nutrient adequacy. Specific nutrients of public health concern for which the patterns do not meet recommendations are potassium and vitamin D;” and 2) “Recommended amounts for food groups and their components fall within the broad range of food group intake distributions for the U.S. population.”

Discussion

Dr. Campbell asked if caffeine was being treated as a component of foods and beverages, as an ingredient, or as part of a food matrix. Dr. Abrams replied that this analysis looked at intakes as ingredients, examining the total intake of caffeine from all sources. He added that more data will be coming on the distribution from food sources to answer question about the food matrix. Dr. Campbell then asked if there are any data on what amount of caffeine promotes addiction. Dr. Neuhouser explained that SC 1 is looking at intakes; SC 5 is looking at health outcomes. Dr. Hu added that SC 5 will be presenting this later today. Dr. Campbell asked about the source of 400 milligrams as a safe intake level and if it is based on intake data. Dr. Abrams noted that Health Canada recommends about 400 milligrams per day, and Dr. Hu added that it varies with children and is based on intake data. Dr. Hu asked what foods are major sources of caffeine. Dr. Abrams replied that the sources by age group will be presented at the next meeting.

Dr. Millen asked if there is a risk of overconsumption of some nutrients in the USDA Food Patterns, noting that the level achieved in a pattern might exceed 100 to as high as 400 percent of the RDA. Dr. Abrams responded that this may broach medical issues, but there is possibility of concern for nutrient-nutrient interactions with high intakes, such as folate-B₁₂ interaction. However, most of these issues are not public health concerns. If there is a UL, amounts in the patterns were evaluated against it. Dr. Lichtenstein added that if there is a UL, it was assessed and, if there is no UL, there is no way to evaluate this.

Dr. Millen asked if the amounts of food groups and subgroups in the USDA Food Patterns fall within the broad range of food group intakes that currently exist in the population and therefore are feasible to implement and communicate to the population. Dr. Abrams responded that this is the point of the patterns—to provide a guidepost for actions that can be taken to meet nutrient requirements through amounts established and balanced across the food pattern. Dr. Abrams

noted that amounts in the patterns are compared to intakes across all age/gender groups. The amounts are within the ranges of normal intakes for virtually all age/sex groups.

Dr. Campbell noted that data on usual intakes below the EAR identified a number of nutrients of concern. However, the data also show the nutrient intakes that are possible if the USDA Food Patterns are consumed. He asked about the magnitude of disconnect between these and if it is feasible that the USDA Food Patterns can overcome the problem with the nutrients of concern. Dr. Neuhouser replied that some of this will be covered in the next section to be presented. The modeling can be interpreted to show what is possible with the USDA Food Patterns and that it is possible to achieve nutrient adequacy.

Food Group Intakes

Dr. Neuhouser then addressed two questions on food group intakes: 1) “What is the current consumption of USDA Food Pattern food groups by the U.S. population?” and 2) “What are the trends in USDA Food Pattern food group consumption by the U.S. population?” She noted that these are disaggregated foods that are grouped into the USDA food pattern food groups; foods as consumed will be addressed in the food categories topic. The evidence used to answer these questions was from WWEIA, NHANES (2001-2004 and 2007-2010) with additional analysis by the National Cancer Institute (NCI) of usual intake distributions and the percent of the population meeting USDA Food Pattern recommendations for their age and sex.

Dr. Neuhouser began with the first question: “What is current consumption of USDA Food Pattern food groups by the U.S. population?” She suggested considering the next several slides as a report card on how the population is doing, showing the percent of the population from each age/sex group that is below, meets, or exceeds recommendations for each food group. For the fruit, vegetable, dairy, and whole grain groups, the majority of the U.S. population are below the recommended intakes. She noted that young children do better in meeting or exceeding the recommendations for fruit and dairy than the rest of the population. Very few in any age/sex group meet recommended amounts for vegetables or whole grains, while the vast majority far exceeds the recommendation for refined grains and calories from solid fats and added sugars. Almost 60 percent of the population meets the recommendation for protein foods. She then stated the draft conclusion statement for this question that: 1) “Across all age and gender groups, the vast majority of the U.S. population does not meet recommended intakes for fruit, vegetables, whole grains, and dairy food groups;” and 2) “Across all age and gender groups, the vast majority of the U.S. population exceeds recommended intakes for refined grains, solid fats, and added sugars.”

Dr. Neuhouser then proceeded with the second question: “What are the trends in USDA Food Pattern food group consumption by the U.S. population?” She reviewed the trends from 2001-04 to 2007-10 using the same approach. She noted that there were few differences in most food group intakes. Some age/sex groups and the total population showed a significant decrease in

vegetable intake and a small increase in whole grain intake during this time period. She presented the draft conclusion statement that, “The U.S. population has made few dietary changes over time (2001-04 to 2007-10). Fruit intake has remained low but stable; vegetable intake has declined, particularly among children of all ages, adolescents, and young adult males; whole grain intake has slightly increased between 2001-04 and 2007-10, particularly among middle aged and older adults; and dairy intake has been relatively constant over time, but has decreased for girls 4 to 8 years and young adult males, and has increased for adults 51 to 70 years.”

Discussion

Dr. Adams-Campbell asked about the dairy recommendations, considering that there is a large lactose-intolerant population. Dr Neuhouser replied that NHANES doesn’t ask survey respondents about lactose intolerance so that other sources would be needed for the answer.

Dr. Pérez-Escamilla noted that yesterday the Committee reported the consistency across healthy dietary patterns, and today reported how far Americans are from achieving those patterns. He reiterated that following the USDA Food Patterns makes it possible to achieve changes with foods in the current food supply. However, changes to the food supply need to occur, or in 5 to 10 years issues will remain. Dr. Neuhouser agreed and noted that she hopes the Committee’s Report will provide some motivation and tools for making progress.

Dr. Nelson asked if there is evidence that the amount of dairy currently consumed is a public health concern and what amounts of dairy in the patterns is healthy. Dr. Neuhouser responded that there is evidence that low-fat dairy is a component of the healthy patterns presented by SC 2, and food pattern modeling is another option for addressing this question. Dr. Abrams added that the majority of intake of calcium and vitamin D in children is from dairy, though there are lactose-free dairy options and other foods sources as well. Dr. Nelson followed up by noting she is mainly asking about adults, and that she would like to know what amounts of dairy are healthy. Dr. Hu agreed that low-fat dairy is part of the dietary patterns that prevent CVD and other diseases, but in amounts less than what is recommended. Dr. Anderson added that SC 1 is going to be taking a close look at these healthful dietary patterns to determine their composition and where they overlap. Dr. Hu noted the optimum amount of dairy for health benefits is unknown, and that there is a contradiction with most people exceeding the limit for solid fats yet not meeting the dairy requirement. This is also true for sodium. How to meet both the recommendations and limits needs to be resolved. Dr. Lichtenstein added that there is high quality protein in dairy foods whereas other calcium sources do not provide the protein which could affect meeting recommendations.

Dr. Hu asked if the vegetable group intake data include French fries and potatoes. Dr. Neuhouser responded that there is additional detailed information on vegetable subgroup intakes,

and what were presented today were total vegetable intakes, which includes potatoes. The big message is that vegetable intake is very low overall.

Dr. Campbell asked for clarification if the fruit and vegetable intakes included juice as well as solid forms. Dr. Neuhouser replied that they did. Dr. Nelson suggested that the intake of young children who are meeting recommendations could all be from juice and Dr. Neuhouser noted that subgroup intakes from juice and non-juice will be examined.

Dr. Campbell then asked about the intakes of protein foods since protein is not a nutrient of concern. He noted that 50 percent or more of young children and early adolescents seem to be consuming the least amount of protein foods and asked if this reflects adequate intake of protein. Dr. Neuhouser replied that the food group intakes relate to amounts in the patterns, not to the EAR or RDA. SC 1 will look more closely at this to see if those with low intakes from food group are meeting nutrient needs.

Food Category Intakes

Dr. Anderson then addressed four questions on the food categories topic: 1) “What are the top foods contributing to energy intake in the U.S. population?;” 2) “What are the top foods contributing to sodium and saturated fat intake in the U.S. population?;” 3) What are current consumption patterns by food categories (foods as consumed) in the U.S. population?;” and 4) “What is the contribution of beverage types to energy intake by the U.S. population?” She noted that the data used was analysis of the 150 WWEIA Food Categories for NHANES 2009-10 for as-consumed foods with adaptations requested for DGAC analyses. The categories were condensed into nine major and 32 sub-categories, and analyzed for percent of total intake for energy, nutrients, and food groups from each major and sub-category.

Dr. Anderson began with the first question: “What are the top foods contributing to energy intake in the U.S. population?” She reviewed key findings that had been presented in March, and presented the draft conclusion statement that 90 percent of total energy intake in the U.S. population came from 16 of the 32 food sub-categories, with mixed dishes, snacks and sweets, and beverages together contributing more than half (56%) of energy intake in the U.S. population.

Dr. Anderson next addressed the second question: “What are the top foods contributing to sodium and saturated fat intake in the U.S. population?” She again reviewed the key findings shown in March, and presented the draft conclusion statement that “the largest contributor to intake of the two nutrients of concern for overconsumption, sodium and saturated fat, were mixed dishes (44% and 33% of total intake, respectively), with the sub-category of burgers and sandwiches being the largest contributor within mixed dishes for both. Snacks and sweets also were a major contributor to saturated fat intake (18% of intake). Sodium is ubiquitous in the food supply and many food categories contribute to intake.”

Dr. Anderson then addressed the third question: “What are current consumption patterns by food categories (foods as consumed) in the U.S. population?” She presented the key findings focusing on food intake from mixed dishes and the food groups and nutrients provided by these mixed dishes. She noted that mixed dishes contributed to dairy intake, but mainly by cheese intake and not fluid milk; did not contribute to fruit intake; and contributed to grain intake. But the grains in these dishes were mainly refined, and whole grains are more likely eaten alone. She then presented the draft conclusion statement that 1) “The mixed dishes food category is the major contributor to some USDA Food Pattern food groups—grains, vegetables, and protein foods;” 2) “Fruit and fluid milk intake are seldom part of mixed dishes;” and 3) “Mixed dishes contribute substantially to intakes of energy, saturated fat, and sodium, but also make important contributions to intake of vegetables, fiber, grains, and dairy.”

Finally, Dr. Anderson addressed the fourth question: “What is the contribution of beverage types to energy intake by the U.S. population?” She showed data that 19 percent of total energy intake comes from beverages, and within those beverages, the largest contributor is sweetened beverages. She presented the conclusion statement that 1) “19 percent of total energy comes from beverages, including milk and 100 percent fruit juice;” 2) “Of this 19 percent of energy, major sources are sugar-sweetened beverages (35%), milk and milk drinks (26%), and 100 percent fruit juices (10%);” and 3) “Beverages supply 47 percent of added sugars intake.”

Discussion

Dr. Brenna asked about the amount of sodium added to foods versus what is intrinsic in the foods. Dr. Anderson replied that the subcommittee has not addressed this, but there is a Sodium Working Group that could. From previous work, 89 percent of the sodium in foods comes from processing/restaurants; 11 percent is added by the consumer during cooking and at the table.

Dr. Pérez-Escamilla noted that it would be important to see how much of a contribution sugar-sweetened beverages make to the added sugars intake of children. Dr. Anderson noted that the subcommittee would try to look at that.

Dr. Campbell asked if the data showed the percent of mixed dishes that are home prepared versus commercially prepared and if the nutrient profile is different for each of these. Dr. Anderson replied that the subcommittee has not looked at this and would check to see if the data allow this distinction. Dr. Campbell continued that it could be an area of future research and may be a way to change behavior/intakes if there is a way to make a statement as to the value or importance of home cooking. Dr. Lichtenstein added that these results could be used to encourage modification of how foods are prepared.

Dr. Hu asked what foods are included in the protein foods group. Dr. Neuhouser responded that the protein foods groups she presented included meat, fish, poultry, and eggs. Another protein food subgroup contains beans and peas, but those were not presented today.

Dr. Millen asked for additional information about how the 150 categories were collapsed and grouped to focus on the mixed dish category. Dr. Anderson noted that the nine categories were described in March, and they include as mixed dishes the single foods identified as eaten in combinations such as sandwiches and salads. Dr. Millen added that this allows the Committee to look at intakes in a different way and show that combinations foods are dominant in the U.S. diet.

Dr. Pérez-Escamilla noted that it would be important to distinguish between hamburgers and sandwiches. He said the message is not to limit sandwich intake but to do a better job with how to make them.

Eating Behaviors

Dr. Story presented four questions on eating behaviors: 1) “What are the current status and trends in the number of daily eating occasions and frequency of meal skipping?;” 2) “How do diet quality and energy content vary based on eating occasion?;” 3) “What are the current status and trends in the location of meal and snack consumption and sources of food and beverages consumed at home and away from home?;” and 4) “What is the diet quality and energy content based on the food and beverage source?”

Dr. Story began with the first question: “What are the current status and trends in the number of daily eating occasions and frequency of meal skipping?” The data are from existing WWEIA, NHANES data tables, from 2009-10 for current status and from 2003-04, 2005-06 and 2007-08 for trends. She noted that the definition of eating occasion is self-report during the NHANES survey, and that these data were presented in detail in March and are summarized here. She also noted additional findings by race/ethnicity and income level, that 1) non-Hispanic Whites were most likely to report consuming three meals a day, and only about half of non-Hispanic Blacks (48%) and Hispanics (52%) consumed all three meals; and 2) that the percent of individuals consuming three meals per day increased with higher income levels. Differences by income level were more evident for older children and adults, with similar percents of children ages 2-5 consuming three meals per day. She presented the draft conclusion statements that 1) “The majority of the U.S. population consumes three meals a day plus at least one snack;” 2) “Among all age groups, children 2 to 5 years old are most likely to consume all three meals;” and 3) “Adolescent girls, young adult males, Blacks, Hispanics, and individuals with lower incomes are least likely to consume three meals a day. Trend data show little change since 2005-06.”

Dr. Story then continued with the second question: “How do diet quality and energy content vary based on eating occasion?” She noted that dietary quality was defined as a comparison of the

nutrient content to the energy content of a specific set of foods, and for this question it was specified as comparing the proportion of nutrient content from an eating occasion to the proportion of energy content at that eating occasion. The data are again a summary of existing WWEIA, NHANES tables from NHANES 2009-10. She summarized the key findings, which were also presented in March, and presented the draft conclusion statements that 1) “Breakfast tends to have a higher overall dietary quality because of its higher nutrient density compared to other meals and snacks;” and 2) “Snacks contribute about one-fourth of daily energy intake and are lower in key nutrients relative to energy intake.”

Dr. Story next presented the third question: “What are the current status and trends in the location of meal and snack consumption and sources of food and beverages consumed at home and away from home?” For this question the data source was a new analysis of WWEIA, NHANES food intake data, from 2009-10 for current status and 2003-04, 2005-06, and 2007-08 for trends. She presented the key findings for this time period, noting that in 2009-10, about 69 percent of foods were purchased in a store and about 58 percent were eaten at home. The trends data showed little change over the past 10 years. She presented the draft conclusion statement that “most of the calories consumed by the U.S. population are purchased at a store (69%) and consumed in the home. The percent of calories eaten away from home (34%) has remained about the same since 2003-04.”

Finally, Dr. Story presented the fourth question: “How do diet quality and energy content vary based on the food and beverage source?” Again, the data source was analysis of WWEIA, NHANES food intake data, from 2009-10 for current status and from 2003-04, 2005-06, and 2007-08 for trends. For this question SC 1 also used the HEI standards for food group and subgroup intake per 1000 kcal, and the *2010 Dietary Guidelines* limit for saturated fat intake. She presented graphs showing trends in food group density (amount of the food group per 1000 calories) by where the food was obtained, for a number of food groups. For the fruit group, the schools and stores had the highest amount of fruit per 1000 calories, while full and quick service restaurants had much less. Full service restaurants had the highest amount of vegetables and protein foods per 1000 kcal. All sources were low for whole grains. Except for protein foods and refined grains, all sources had a lower density than the HEI standard with the exception of dairy foods from schools. Saturated fat and sodium were higher than the limit from all sources. She then presented the draft conclusion statement that 1) “Food group and nutrient quality as measured by the HEI vary by where food is obtained;” and 2) “Overall, no matter where the food is obtained, diet quality of the U.S. populations does not meet recommendations for fruit, vegetables, dairy, whole grains, and exceeds recommendations for sodium, saturated fats, refined grains, solid fats, and added sugars.”

Discussion

Dr. Pérez-Escamilla noted that meal skipping is a coping behavior for household food insecurity and asked if meal eating frequency could be reported by food security level. Dr.

Lichtenstein added that she would also like to see these data by time of year, especially for children who eat school meals. Dr. Story replied that SC 1 would look into this, but was not sure if NHANES captures this. They can be noted as caveats.

Dr. Adams-Campbell asked if there is any way to assess continuous eating. Since half of Hispanics and Blacks do not eat three meals a day, snacking needs to be considered. Dr. Story noted that the number of snacks per day is available, and SC 1 can look at that. A limitation is that it is self-reported—there is no definition for what constitutes a meal. Coffee could be a breakfast if the person said so. A research recommendation is the need for a good definition for what constitutes a meal and a snack. Dr. Neuhouser added that the multiple-pass method is used by the interviewer, so the dietary interview is a very thorough interview and of high quality. Dr. Adams-Campbell recognized the quality of the interview but noted concerned that people may want to provide “the right answer” for dietary intake assessments.

Dr. Campbell asked if the first draft conclusion statement for question two is based on all the nutrients. He noted that breakfast is notoriously poor for protein, but it is not reflected here because it is not a nutrient of concern. Dr. Story responded that additional nutrients, including protein, were considered, but the conclusion is based on the nutrients of concern. Protein could be added back to the graph if desired. Dr. Campbell suggested clarifying that the conclusion statements are looking at nutrients of concern.

Dr. Hu suggested using the HEI to evaluate breakfast. Dr. Story said SC 1 would look into this.

Dr. Campbell asked what key nutrients were being referred to in the draft conclusion statement for snacks. Dr. Story noted that these were the nutrients of public health concern, those that were underconsumed.

Dr. Nelson noted that in the food sources graph of school data, fruit is going up and vegetables are going down. If French fries are going down, that is a good thing, but if green vegetables are going down, that is not good. Dr. Story said SC 1 would look into this.

Dr. Hu asked if the high intake of added sugars from snacks is coming from sugar-sweetened beverages. Dr. Story noted that is the assumption, but will look into it. She added that saturated fat and sodium are actually low in snacks compared to energy.

Dr. Millen noted that SC 1 used a solid approach, but needs clarification for the readership. She asked if the nature of the market basket from stores could be evaluated, especially ready-made foods from the store versus food from fast food establishments. Dr. Adams-Campbell added that food from stores includes ready-to-eat items like frozen meals, as well as single foods to prepare. Dr. Story noted that she is not sure that can be discerned because of the way data are reported.

Health Conditions

Dr. Anderson identified the two questions on health conditions that will be presented today:

1) “What is the current prevalence of overweight/obesity and distribution of body weight, BMI, and waist circumference in the U.S. population and age, gender, racial/ethnic, and income groups? What are the trends in prevalence?” and 2) “What are the current rates of nutrition-related health outcomes (i.e., incidence of and mortality from cancer [breast, lung, colorectal, prostate] and prevalence of high blood pressure, CVD, and T2D) in the overall U.S. population?”

Dr. Anderson began with the first question: “What is the current prevalence of overweight/obesity and distribution of body weight, BMI, and waist circumference in the U.S. population and age, gender, racial/ethnic, and income groups? What are the trends in prevalence?” The data sources for this question included analysis by CDC/NCHS of NHANES 2009 -2012 data, summaries of NHANES data tables from the CDC website, and published peer-reviewed articles by CDC authors for various survey years including 1988-94 to 2011-12. She noted that some of these data were presented in March; she summarized those data and presented additional data by age/sex groups, race/ethnicity, and income level. She then presented the draft conclusion statement that 1) “Among children, adolescents, and adults, rates of overweight and obesity are extremely high;” 2) “These high rates have persisted for more than 25 years. Nearly one in three youth 2 to 19 years old is now overweight or obese. Overall, 65 percent of adult females and 70 percent of adult males are overweight or obese, and rates are highest in middle-aged and older adults;” and 3) “Overweight and obesity disproportionately affect adults with lower income, and children, adolescents, and adults who are Hispanic or African-American.”

Dr. Millen continued with the second question: “What are the current rates of nutrition-related health outcomes (i.e., incidence of and mortality from cancer [breast, lung, colorectal, prostate] and prevalence of high blood pressure, CVD, and T2D) in the overall U.S. population?”

The data sources for this question included analysis by CDC/NCHS of NHANES 2009 -2012 data; the National Health Interview Survey, 2012; the SEARCH for Diabetes in Youth Study; the AHA, 2014 report; and the Surveillance, Epidemiology, and End Results Program of the NCI. She shared key findings on CVD, that rates are relatively high and increase with age; that rates of coronary heart disease and stroke are highest in minority populations and those in poverty; that hypertension rates rise with age and are highest in Black adults, those who have established overweight and obesity and abdominal obesity; and that in youth, rates of borderline high blood pressure rise with age and are most pronounced in African American youth and those who are overweight or obese. Findings on diabetes include that rates in adults rise with age, are higher in Black adults and in those with obesity. In children, diabetes rates are higher in girls, adolescents, and Black youth. For the four types of cancers examined, rates vary with age, by race/ethnicity, and by sex. She then shared the draft conclusion statement that 1) “Adults have high rates of nutrition-related chronic diseases, including high blood pressure, CVD, T2D, and various forms of cancer;” 2) “Children and adolescents have nutrition-related chronic diseases, including elevated blood pressure and T2D;” and 3) “At all ages, rates of chronic disease risk are linked to overweight and obesity. These chronic diseases disproportionately affect various racial and ethnic groups.”

Discussion

Dr. Adams-Campbell asked if SC 1 could look at metabolic syndrome. Dr. Millen replied that this would be included, but the data are not yet ready for presentation.

Dr. Nelson then noted that the graph on income shows it was only obesity and not overweight that differs by income, and the conclusion statement for the first question overstates and over generalizes this. Dr. Millen agreed and noted that SC 1 will edit this.

Dr. Adams-Campbell asked if the SC has looked at premenopausal breast cancer versus postmenopausal by race/ethnicity. Dr. Neuhouser noted that this was not done.

Dr. Hu noted that while some risk factors for cancers and CVD have increased, there has been progress in reducing morbidity and mortality related to smoking. Dr. Millen explained that the emphasis for SC 1 in pulling this data together is not only to key up work for other subcommittees on diet quality and dietary patterns in relation to health outcomes, but it also goes beyond what the Committee has done in the past and will bring focus on diet-related chronic diseases.

Dr. Story asked if SC 1 would look at bone health and osteoporosis. Dr. Millen noted that this would be included, along with several other health outcomes.

Dietary Patterns Composition

Dr. Neuhouser then presented a status report on two questions related to dietary patterns composition that the SC is addressing: 1) “What is the composition of dietary patterns with evidence of positive health outcomes (e.g., Mediterranean, Dietary Approaches to Stop Hypertension (DASH), HEI, vegetarian), and of patterns commonly consumed in the U.S.?” and 2) “What are the similarities (and differences) within and amongst the dietary patterns with evidence of positive health outcomes and the commonly consumed dietary patterns?”

In the SC 2 presentation, the Committee saw these dietary patterns related to chronic disease risk. What SC 1 is doing is drilling down to see what the foods and amounts are in these patterns. For these, the approach for the first question is to identify and summarize the quantitative food group composition of dietary patterns found to be associated with positive health outcomes, focusing on major prospective cohort studies and interventions from SC 2 evidence reviews. For question two, the approach is to compare and contrast the composition of these patterns to each other, to the USDA Food Pattern recommendations, and to commonly consumed dietary patterns in the U.S. The SC hopes to present this at the September meeting.

Next Steps

Dr. Neuhouser continued by outlining the next steps for SC 1's work, which are to: 1) Examine food intake from food categories and by location of eating by age groups and other demographic characteristics; 2) Complete analysis of Dietary Patterns composition; 3) Address additional questions related to specific food groups; 4) Review additional food pattern modeling analyses; and 5) Examine prevalence for additional nutrition-related health conditions. She noted that based on the discussion today, there would be additions to this list.

Dr. Nelson then commented that this was such a useful addition to the work of the Committee but asked if the findings should be presented as conclusions. She asked that the terminology for these be considered. Dr. Neuhouser responded that this would be a good topic for discussion.

Dr. Campbell noted that the nutrients of concern for excess consumption are not a uniform way of presenting saturated fat, added sugars, or sodium. The public comments encourage the Committee to separate these out. He asked if, based on the data, if this possible. Dr. Neuhouser noted that it would be good to not have them together; this will be discussed at the September meeting.

Physical Activity Writing Group (PAWG)

Dr. Miriam Nelson began the presentation by giving a brief historical overview of the physical activity topic area within the context of the *Dietary Guidelines for Americans*. She noted that the *Dietary Guidelines for Americans, 2010* brought forward the major findings from the *2008 Physical Activity Guidelines for Americans*. She added that work on potential future editions of the *Physical Activity Guidelines* is currently underway, which supports the Committee's decision to use evidence from existing *Physical Activity Guidelines* reports rather than completing *de novo* literature searches in the area of physical activity. Dr. Nelson went on to recognize fellow PAWG members, Dr. Wayne Campbell and Dr. Alice H. Lichtenstein.

Dr. Nelson provided an overview of the Committee's approach to addressing the topic. The Committee agreed to use existing systematic reviews and reports to address physical activity, and identified three *Physical Activity Guidelines*-related reports to serve as primary sources of evidence: *Physical Activity Guidelines Advisory Committee Report, 2008*; *2008 Physical Activity Guidelines for Americans*; and *Physical Activity Guidelines for Americans Midcourse Report: Strategies to Increase Physical Activity Among Youth* (2013). The PAWG then reviewed and extracted key findings as well as relevant methodology considerations from these reports. After extracting key findings, the PAWG developed research questions, identified the most important findings from the reports to answer the questions, determined the strength of the evidence, and drafted conclusion statements. Dr. Nelson added that the PAWG intends to review the latest surveillance data on national physical activity levels, both self-reported data and objective measurements (e.g., accelerometry).

She went on to describe the primary physical activity topic areas as: 1) Physical activity and health outcomes in the general population, children, and adults (including older adults); 2) Physical activity dose in children, adults, and older adults; and 3) Physical activity interventions in children.

Dr. Nelson presented questions and the draft conclusion statement for physical activity and health outcomes in the general population. There are four questions for this topic area, including: 1) “What is the relationship between physical activity, body weight, and other health outcomes?;” 2) “What is the relationship between physical activity and cardiorespiratory health?;” 3) “What is the relationship between physical activity and metabolic health?;” and 4) “What is the relationship between physical activity and musculoskeletal health?” The primary source of evidence used to address these questions was the *Physical Activity Guidelines Advisory Committee Report, 2008*.

Dr. Nelson went on to present the draft conclusion statement for physical activity and health outcomes in the general population as follows: “Being physically active is one of the most important steps that Americans of all ages can take to improve and maintain their health. Physically active people have a reduced risk of most chronic diseases, a reduced risk of becoming overweight or obese, and improved physical function than do people who are inactive. There is a clear relationship between physical activity and cardiorespiratory health and metabolic health in all age groups, including improved cardiorespiratory fitness and reduced risk for T2D and metabolic syndrome. High-intensity muscle-strengthening activity enhances skeletal muscle mass, strength, power, and intrinsic neuromuscular activation” (DGAC grade: Strong).

Dr. Nelson then presented the draft conclusion statement for physical activity and health outcomes in children for the question: “What is the relationship between physical activity, body weight, and other health outcomes?” The primary source of evidence used to address this question was the *Physical Activity Guidelines Advisory Committee Report, 2008*. The draft conclusion was: “Strong evidence demonstrates that the physical fitness and health status of children and youth is substantially enhanced by frequent physical activity. Compared to inactive young people, physically active children and youth have higher levels of cardiorespiratory endurance and muscular strength. Well documented health benefits include lower body fatness, more favorable cardiovascular and metabolic disease risk profiles, enhanced bone health, and reduced symptoms of anxiety and depression. These conclusions are based on the results of observational studies in which higher levels of physical activity were found to be associated with favorable health parameters as well as experimental studies in which exercise treatments caused improvements in physical fitness and various health-related factors” (DGAC grade: Strong).

Next, Dr. Nelson presented questions and the draft conclusion statements for physical activity and health outcomes in adults, including older adults. There are four questions for this topic area, including: 1) “What is the relationship between physical activity, body weight, and other health outcomes?;” 2) “What is the relationship between physical activity and musculoskeletal health?;” 3) “What is the relationship between physical activity and prevention of breast and colon cancer?;” and 4) “What is the relationship between physical activity and mental health?” The primary source of evidence used to address these questions was the *Physical Activity Guidelines Advisory Committee Report, 2008*.

Dr. Nelson presented the draft conclusion statement for physical activity and health outcomes in adults, including older adults as follows: “Compared to less active people, physically active adults, including older adults, exhibit a higher level of cardiorespiratory and muscular fitness, healthier body mass and composition, and a biomarker profile that is more favorable for preventing CVD and T2D and enhancing bone health. In addition, physically active adults and older adults have lower rates of all-cause mortality, coronary heart disease (CHD), high blood pressure, stroke, T2D, metabolic syndrome, colon cancer, breast cancer, and depression compared to less active counterparts. Physically active adults who are overweight or obese experience a variety of health benefits that are generally similar to those observed in people of ideal body weight. There is a clear relationship between physical activity and prevention of breast and colon cancer. Physical activity reduces risk of depression and cognitive decline in adults and older adults” (DGAC grade: Strong).

She continued the draft conclusion statement as follows: “Physical activity is associated with higher levels of functional health and a lower risk of falling in older adults. In older adults with existing functional limitations, fairly consistent evidence indicates that regular physical activity is safe and has a beneficial effect on functional ability. Reasonably consistent evidence indicates that physically active adults and older adults have better quality sleep and health-related quality of life” (DGAC grade: Moderate). Dr. Nelson noted that if future *Physical Activity Guidelines* were to address this area, current evidence would likely be *strong*.

Dr. Nelson presented the question and the draft conclusion statement for physical activity dose in children. There is one question for this topic area: “What dose of physical activity is most likely to provide health benefits?” The primary sources of evidence used to address this question are the *Physical Activity Guidelines Advisory Committee Report, 2008* and the *2008 Physical Activity Guidelines for Americans*.

Dr. Nelson presented the draft conclusion statement for physical activity dose in children as follows: “Substantial evidence indicates that important health and fitness benefits can be expected to accrue to most children and youth who participate daily in 60 or more minutes of moderate to vigorous physical activity. Certain specific types of physical activity should be included in an overall physical activity pattern in order for children and youth to gain comprehensive health benefits. These include regular participation in each of the following types of physical activity on three or more days per week: resistance exercise to enhance muscular strength in the large muscle groups of the trunk and limbs, vigorous aerobic exercise to improve cardiorespiratory fitness and cardiovascular and metabolic disease risk factors, and weight-loading activities to promote bone health. Therefore, the Committee concurs with the *2008 Physical Activity Guidelines for Americans* that to achieve health benefits, children and adolescents should engage in 60 minutes (1 hour) or more of physical activity daily. Most of the 60 or more minutes a day should be either moderate- or vigorous-intensity aerobic physical activity and should include vigorous-intensity physical activity at least three days a week. As part of their 60 or more minutes of daily physical activity, children and adolescents should include muscle-strengthening physical activity on at least three days of the week, as well as bone-strengthening physical activity on at least three days of the week” (DGAC grade: Strong).

Next, Dr. Nelson presented the question and the draft conclusion statement for physical activity dose in adults, including older adults. There is one question for this topic area: “What dose of physical activity is most likely to provide health benefits?” The primary sources of evidence used to address this question are the *Physical Activity Guidelines Advisory Committee Report, 2008* and the *2008 Physical Activity Guidelines for Americans*.

Dr. Nelson presented the draft conclusion statement for physical activity dose in adults, including older adults as follows: “For overall public health benefit, data from a large number of studies evaluating a wide variety of benefits in diverse populations generally support 30 to 60 minutes per day of moderate- to vigorous-intensity physical activity on five or more days of the week. For a number of benefits, such as lower risk for all-cause mortality, CHD, stroke, hypertension, and T2D in adults and older adults, lower risk is consistently observed at two and a half hours per week of moderate-to-vigorous-intensity activity. The amount of moderate-to-vigorous-intensity activity most consistently associated with significantly lower rates of colon and breast cancer and the prevention of unhealthy weight gain or significant weight loss by physical activity alone is in the range of three to five hours per week. For a variety of health and fitness outcomes, including chronic disease prevention, improvement of various disease biomarkers and the maintenance of a healthy weight, reasonably strong evidence demonstrates that amounts of moderate-to-vigorous-intensity activity that exceed 150 minutes per week are associated with greater health benefits. Therefore, the Committee concurs with the *2008 Physical Activity Guidelines for Americans* that to achieve health benefits, all adults should avoid inactivity. Some physical activity is better than none, and adults who participate in any amount of physical activity gain some health benefits. To gain substantial health benefits, adults should do at least 150 minutes (2 hours and 30 minutes) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. For additional and more extensive health benefits, adults should increase their aerobic physical activity to 300 minutes (5 hours) a week of moderate intensity, or 150 minutes a week of vigorous intensity activity, or an equivalent combination of moderate- and vigorous-intensity activity. Additional health benefits are gained by engaging in physical activity beyond this amount. Adults should also do muscle-strengthening activities that are moderate or high intensity and involve all major muscle groups on two or more days a week, as these activities provide additional health benefits.” (DGAC grade: Strong).

Dr. Nelson presented the question and the draft conclusion statement for physical activity dose in older adults. There is one question for this topic area: “Are there any special considerations for what dose of physical activity is most likely to provide health benefits for older adults?” The primary sources of evidence used to address this question are the *Physical Activity Guidelines Advisory Committee Report, 2008* and the *2008 Physical Activity Guidelines for Americans*.

Dr. Nelson presented the draft conclusion statement for physical activity dose in older adults as follows: “The evidence indicates that because the exercise capacity of adults tends to decrease as they age, older adults generally have lower exercise capacities than younger persons. Older adults need a physical activity plan that is of lower absolute intensity and amount (but similar in relative intensity and amount) than is appropriate for more fit people, especially when they have been sedentary and are starting an activity program. For older adults at risk of falling, strong

evidence exists that regular physical activity is safe and reduces falls by about 30 percent. Most evidence supports a program of exercise with the following characteristics: three times per week of balance training and moderate-intensity muscle-strengthening activities for 30 minutes per session and with additional encouragement to participate in moderate-intensity walking activities two or more times per week for 30 minutes per session. Some evidence, albeit less consistent, suggests that tai chi exercises also reduce falls. Successful reduction in falls by tai chi interventions resulted from programs conducted from one to three hours or more per week. No evidence indicates that planned physical activity reduces falls in adults and older adults who are not at risk for falls. Therefore, the DGAC concurs with the 2008 *Physical Activity Guidelines for Americans* that to gain health benefits from physical activity, older adults should follow the adult recommendations for dose of physical activity. Older adults who are at risk for falls should incorporate balance training exercises into their physical activity routine. When older adults cannot do 150 minutes of moderate-intensity aerobic activity a week because of chronic conditions, they should be as physically active as their abilities and conditions allow. Older adults should determine their level of effort for physical activity relative to their level of fitness. Older adults with chronic conditions should understand whether and how their conditions affect their ability to do regular physical activity safely” (DGAC grade: Strong).

Next, Dr. Nelson presented questions and the draft conclusion statement for physical activity interventions in children. There are four questions for this topic area, including: 1) “What is the relationship between school-based physical activity interventions and increased physical activity?;” 2) “What is the relationship between early child care and education center-based interventions and increased physical activity?;” 3) “What is the relationship between home-based exercise programs and increased physical activity?;” and 4) “What is the relationship between the built environment and amount of physical activity?” The primary source of evidence used to address these questions is the *Physical Activity Guidelines for Americans Midcourse Report: Strategies to Increase Physical Activity Among Youth* (2013).

Dr. Nelson presented the draft conclusion statement for physical activity interventions in children as follows: “Multi-component school-based interventions can increase physical activity in children during school hours. Enhanced physical education (PE) can increase overall physical activity in children and physical activity time during PE class” (DGAC grade: Strong). She continued the draft conclusion statement as follows: “Evidence is limited, but consistent, that school-based physical activity breaks can increase physical activity among children. Reasonably consistent evidence suggests that improving the built environment can increase physical activity in children” (DGAC grade: Limited). Dr. Nelson noted that evidence is limited primarily due to a small research base rather than an inconsistent evidence base. She continued the draft conclusion statement as follows: “Evidence to date is insufficient to conclude that intervention strategies in the home or early education centers increase physical activity in children” (DGAC grade: Not Assignable). Dr. Nelson noted that because research in this area is emerging, there is currently not enough evidence to assign a DGAC grade for this conclusion statement.

Dr. Nelson briefly described the PAWG’s next steps, which included crafting an overall implications statement and drafting the physical activity chapter for the 2015 DGAC Report. She added that given the exceedingly low participation rates of physical activity among all age groups, the overall implications statement for the physical activity topic area will emphasize the

importance of creating environments that facilitate opportunities for all Americans to be physically active, as well as the value of physical activity in promoting health and preventing disease.

Discussion

Dr. Neuhouser questioned the PAWG’s rationale for giving a strong evidence grade to the physical activity dose in adults, including older adults, conclusion statement, which addresses evidence on physical activity and specific cancer outcomes (i.e., breast and colon). She noted that recent data suggests evidence in this area is limited and encouraged the PAWG to review current literature on physical activity and cancer prevention. She added that the National Cancer Institute’s Provocative Questions Initiative identifies the relationship between physical activity dose and cancer prevention as a major question. Dr. Nelson noted that the 2008 Physical Activity Guidelines Advisory Committee’s grade of “Strong” was carried forward for this question; however, the PAWG will take Dr. Neuhouser’s comments under advisement and revisit the evidence grade given her concerns. Drs. Campbell and Lichtenstein agreed to this approach.

Dr. Lichtenstein asked if the Committee should consider addressing potential disincentives for participation in physical activity within the school setting given the low and disparate participation rates in physical activity, particularly beginning in middle school-aged children. Dr. Nelson responded that there is ongoing work in this area to ensure all children participate in physical activity during the school day, especially in elementary school-aged children. She agreed that greater efforts are needed in middle and high schools and noted this is a potential topic area for future editions of the *Physical Activity Guidelines*. Dr. Lichtenstein added this area should be emphasized in the physical activity chapter of the 2015 DGAC Report.

Dr. Pérez-Escamilla asked if the Committee should include a statement regarding the need for older adults and individuals with chronic conditions to consult a physician before engaging in physical activity regimens. Dr. Nelson responded that the PAWG was selective when bringing forward evidence statements from the *Physical Activity Guidelines* reports due to the extensive content within those reports, but agreed that a statement regarding safe physical activity could be incorporated into the relevant draft conclusion(s) for older adults. She added that the *Physical Activity Guidelines* addresses this area and evidence suggests that recommending healthy older adults consult a physician before engaging in moderate-intensity physical activity is actually a barrier to increasing physical activity; however, individuals with existing chronic disease should consult their physician before increasing their level and/or intensity of physical activity.

Dr. Adams-Campbell noted that the recommendation for 300 minutes of weekly physical activity seems unrealistic given the low levels of physical activity among all age groups. She went on to ask if “exer-gaming” or “active video gaming” was included in the evidence for children. Dr. Nelson noted that the 2008 Physical Activity Guidelines Advisory Committee assessed total physical activity in children rather than specific types of physical activity and added that future editions of the *Physical Activity Guidelines* should address evidence in this area. She went on to note that the PAWG reviewed the evidence on physical activity, not evidence on physical activity messaging.

Dr. Hu noted the importance of emphasizing the synergistic effects of combining diet and physical activity strategies to improve health outcomes. He added that evidence suggests consumption of high quality protein can enhance the benefits of physical activity as well as the prevention of abdominal obesity, particularly in older adults. Dr. Hu also noted that recommendations to reduce sedentary behaviors are just as important as recommendations to increase physical activity behaviors. He went on to say that the evidence on sedentary behaviors and adverse health outcomes (i.e., obesity, diabetes, and mortality) has grown tremendously over the past several years. He asked if it is possible to supplement the *Physical Activity Guidelines* reports with new literature that emphasizes the consequences of sedentary behaviors and/or benefits of reducing sedentary behaviors. Dr. Nelson responded that the introduction and/or contextual information for the physical activity chapter could highlight the importance of reducing sedentary behaviors as well as the synergistic effects of combining diet and physical activity. She added that the PAWG will discuss these areas further but noted it is important to maintain the PAWG's approach and scope, particularly given the work occurring on a potential future edition of the *Physical Activity Guidelines*. She went on to say she would like to be very cautious about completing *de novo* literature searches in the physical activity topic area.

Dr. Pérez-Escamilla asked if a statement could be incorporated regarding physical activity for women who are pregnant and lactating. Dr. Nelson agreed that evidence on understudied populations (i.e., women who are pregnant, women in the postpartum period, and individuals with disabilities) can be added to draft conclusion statements.

Dr. Pérez-Escamilla commented that by 2020, the *Dietary Guidelines* will include recommendations for infants and noted that evidence on physical activity in young children is needed. He added that while this is an interesting area, it is a topic that should be addressed by future Physical Activity Guidelines and Dietary Guidelines Advisory Committees. Dr. Nelson agreed that this is an interesting and important topic area and added that the *Physical Activity Guidelines* is intended for Americans ages 6 years and older because there was insufficient evidence to make recommendations for individuals 2 to 6 years old. She added that she is unsure if future *Physical Activity Guidelines* recommendations will address this age group, but emphasized the limited capacity and scope of the PAWG to complete *de novo* and/or extensive searches of the current physical activity literature.

Dr. Millen asked if the physical activity chapter will address current low levels of physical activity. Dr. Nelson responded that new surveillance data will be released soon and added that the PAWG will present trend data during the next public meeting.

Dr. Millen went on to ask if evidence on cumulative physical activity and minimum bout will be included in the physical activity chapter. Dr. Nelson responded that the evidence supports a minimum bout of 10 minutes but that this may be an area of investigation for future Physical Activity Guidelines Advisory Committees. She added that it is possible that "micro bouts" of physical activity accumulated over time may be beneficial; however, those data were not available to the 2008 Physical Activity Guidelines Advisory Committee. She also noted that the PAWG wants to be careful not to craft communication messages and instead maintain the language and findings from the *Physical Activity Guidelines* reports. She added that information

regarding minimum bouts of physical activity and accumulation can be incorporated into the introduction or other content within the physical activity chapter.

Dr. Lichtenstein noted that rather than older adults checking with their physicians about physical activity, physicians should consult their older adult patients about physical activity. Dr. Nelson agreed and noted that the *Physical Activity Guidelines* encourages physicians and providers to discuss physical activity with their patients.

Dr. Campbell commented that perceptions regarding achieving health benefits from physical activity should not be a barrier to achieving recommended levels of physical activity. He added that recommendations for physical activity dose reflect the evidence and noted that they are not intended to discourage individuals from engaging in any level of physical activity. He emphasized the importance of small amounts of physical activity accumulated over periods of time but discouraged the Committee from focusing on minimum levels rather than recommended levels. Dr. Nelson agreed and provided examples of how individuals might achieve recommended levels of physical activity over the course of a week. She noted that another area of interest is light activity, but there was insufficient evidence to address this area in the 2008 *Physical Activity Guidelines*. Dr. Millen noted that she agrees the Committee should accurately reflect the evidence on physical activity levels and bouts but noted there is an opportunity to highlight the many ways *Physical Activity Guidelines* recommendations might be achieved over time. Dr. Nelson added that the *Physical Activity Guidelines* reports and supplemental communications materials provide excellent examples of ways in which to achieve *Physical Activity Guidelines* recommendations.

Dr. Adams-Campbell commented that most physical activity research has been completed in healthy populations and noted a lack of evidence in understudied populations (i.e., various ethnic or racial groups). Dr. Nelson noted that the 2008 Physical Activity Guidelines Advisory Committee reviewed evidence on a variety of vulnerable populations such as individuals with disabilities, but agreed that more research is needed across understudied populations.

Subcommittee 5 (SC 5): Food Sustainability and Safety

Dr. Miriam Nelson, Chair SC 5, began by acknowledging the SC 5 members: Dr. Steven Abrams, Dr. Thomas Brenna, Dr. Frank Hu, and consultants, Dr. Timothy Griffin and Dr. Michael Hamm. She also acknowledged Dr. Barbara Millen and staff working with SC 5.

Dr. Nelson reviewed the scope for SC 5 which is to address food and nutrition issues that will inform public health action and policies to promote the health of the population through food safety and long-term food security. She shared a definition of food security adapted from the Food and Agriculture Organization (FAO): “Food security exists when all people living in the U. S., now and in the future, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs for an active and healthy life.” In addition, Dr. Nelson described a draft working definition for sustainable diets as “a pattern of eating that promotes health and

well-being, and provides food security for current and future populations while sustaining human and natural resources.”

Dr. Nelson showed a SC 5 visual framework demonstrating that food sustainability and security and food patterns intake all come together to support health. The key SC 5 topic areas that were highlighted are normal and high-dose coffee/caffeine consumption, aspartame consumption, behaviors for the prevention of foodborne illness, and dietary patterns and sustainability.

Dr. Nelson reported that SC 5 invited two experts since March to inform the subcommittee work and additionally two consultants continue to work as members of SC 5. The invited experts and consultant SC 5 members are listed below:

Invited Experts

Laurel Bryant, Chief, External Affairs, National Oceanic and Atmospheric Administration, Fisheries Communications Office

Michael B. Rust, Science Coordinator, Office of Aquaculture, National Oceanic and Atmospheric Administration Fisheries

Consultant SC 5 Members

Michael Hamm, C.S. Mott Professor of Sustainable Agriculture; Departments of Community Sustainability, Food Science and Human Nutrition, and Plant, Soil and Microbial Sciences; College of Agriculture and Natural Resources, Michigan State University

Timothy Griffin, Director, Agriculture, Food and Environment Program and Associate Professor at the Friedman School of Nutrition Science and Policy at Tufts University

Dr. Nelson shared the list of SC 5 questions that would be presented: 1) “What is the relationship between normal caffeine consumption and health?;” 2) “What is the relationship between high-dose caffeine consumption and health?;” 3) “What is the relationship between aspartame consumption and health?;” and 4) “What is the relationship between population-level dietary patterns and long-term sustainability and related food security?”

Dr. Hu presented an update on the topic of normal caffeine/coffee consumption and health. The Committee conducted an overview of systematic reviews and meta-analyses published since 2000 on coffee/caffeine and various health outcomes. More than 50 meta-analyses and systematic reviews on coffee and caffeine intake and health outcomes were identified by the evidence review. Most of the papers were published recently and the quality was fairly high. The evidence review included systematic reviews and meta-analyses on total mortality, CVD (including stroke, CHD, atrial fibrillation, blood pressure (BP), and blood lipids), T2D, cancer, cognition, and Parkinson’s disease.

Dr. Hu reported the key findings for CVD and T2D. “Moderate coffee consumption in adults (3-5 c/d, up to 400 mg/d of caffeine) was inversely associated with total mortality, especially CVD mortality. In addition, moderate coffee consumption was inversely associated with CVD risk and the lowest risk was at three to five cups per day. There was no evidence of an association between long-term coffee consumption and increased BP, yet unfiltered but not filtered coffee was shown to increase blood lipids. Coffee consumption was inversely associated with T2D risk in a dose-response manner. Regular coffee and de-caffeinated coffee were shown to provide similar T2D risk reduction.”

The key findings on coffee and cancer outcomes were reviewed. Coffee consumption was consistently associated with a lower risk of liver cancer and endometrial cancer. A null or a weak inverse association was observed for postmenopausal breast cancer, ovarian cancer, prostate cancer, pancreatic cancer, and colorectal cancer. Confounding by smoking was observed for the association between coffee intake and lung and bladder cancers.

Dr. Hu presented draft conclusion statements on normal coffee/caffeine and chronic diseases. “Strong and consistent evidence shows that consumption of coffee/caffeine within the moderate range (3-5 cups/d or up to 400 mg/d of caffeine) is not associated with increased risk of major chronic diseases such as CVD and cancer in healthy adults. Additionally, strong and consistent evidence shows that moderate coffee consumption is associated with lower risk of cardiovascular disease and T2D in healthy adults. There is no evidence that higher coffee consumption is associated with an increased risk of cardiovascular disease. Consistent evidence indicates that regular consumption of coffee is associated with lower risk of cancer of the liver and endometrium and slightly inverse or null associations are observed for other cancer sites.”

Key findings for normal caffeine and neurodegenerative disease were presented by Dr. Hu. Some evidence suggests an inverse association between caffeine from different sources and cognitive impairment and Alzheimer’s disease, and an association between caffeine intake and a moderately lower risk of various measures of cognitive decline/impairment. An inverse association was consistently found between higher caffeine intake and lower risk of Parkinson’s disease. Draft conclusions were presented for caffeine and neurodegenerative disease. “Strong and consistent evidence indicates a protective association between caffeine intake and risk of Parkinson’s disease. Limited evidence indicates that caffeine consumption is associated with a modestly lower risk of cognitive decline or impairment and lower risk of Alzheimer’s disease.”

Dr. Hu presented draft implications for normal coffee/caffeine intake and chronic and neurodegenerative disease. “Moderate coffee/caffeine consumption can be incorporated with other healthy behaviors, such as refraining from smoking, consuming a nutritionally balanced diet, and being physically active. Coffee as it is normally consumed can contain added calories from cream, milk, and added sugars. It is important to be aware of these caloric additions.”

Draft research recommendations were presented on normal caffeine and chronic diseases. Prospective cohort studies with adequate control for smoking should examine the association between coffee (caffeinated and decaffeinated) and cancers. Biological mechanisms should be investigated for the inverse associations between coffee and risk of T2D and CVD in animal and human experimental studies. Although strong evidence supports a protective effect of moderate coffee consumption on chronic disease risk in healthy adults, the association among those with existing diseases has been less studied. Because coffee is a known stimulant, future studies should examine the effects of coffee/caffeine on sleep quality, dependency, addiction, and overall quality of life measures. Given the limited evidence on normal caffeine intake and neurodegenerative diseases, well-designed prospective studies should examine the association between coffee/caffeine and cognitive decline, depression, and Alzheimer's disease.

It was noted that SC 5 will be conducting a NEL search regarding the association of normal caffeine and pregnancy outcomes.

Discussion

Dr. Lichtenstein stated that in the past, there was concern about coffee or caffeine and BP and other health outcomes, and it has not been corroborated. She asked if SC 5 evaluated the relationship between coffee/caffeine consumption and BP. Dr. Hu responded that SC 5 did look at this topic and that there are acute effects of caffeine intake on BP, blood glucose, and heart rate. After a high dose of caffeine, there is an increase in heart rate, blood glucose, and BP. Meta-analyses looked at long term incidence of hypertension and there was no increased risk. Dr. Lichtenstein suggested that there should be text about this in the report, especially the acute effects on BP. Dr. Hu said the chapter summarizes the acute studies on blood pressure, but those results cannot be extrapolated to long term effects.

Dr. Lichtenstein recommended a change in the evidence statement in terms of association with CVD and regular coffee, and an additional qualifier in terms of decaffeinated coffee, noting the statement confers similar benefits, but rather it is an association. Dr. Hu agreed.

Dr. Pérez-Escamilla suggested caution with the coffee/caffeine piece since other drinks have caffeine. If the message is related to coffee intake then that should be made clear. He understood why the evidence statements were written with this language since they are based on the evaluation of the studies. Dr. Hu agreed.

Dr. Campbell suggested that it is an unclear message as to whether the effect is from coffee or caffeine. The effects for blood glucose have been identified clearly, but not for other outcomes. The messaging could potentially be misused for marketing since caffeine can be added to other products. He asked about the risk of excess caffeine intake for products with hidden caffeine and the scientific basis for the 400 milligrams is sound and if it is based on physiology or intake. Dr. Hu responded that the science base for the 400 milligrams is very limited. The dose-response relationship has not been clearly established for health outcomes. For CVD there a non-linear response, with lowest CVD risk for 3-5 cups/day and increased consumption not associated with

increased risk [delete: is a u-shaped relationship for three to five cups coffee/day. Five cups of coffee is close to 400 milligrams per day for caffeine. Other beverages and foods such as chocolate provide caffeine. Dr. Campbell added that the caffeine contribution from other foods and beverages is relatively minor compared to coffee consumption. Dr. Campbell asked if it is the coffee as a beverage or the caffeine in the coffee, adding the answer should be clearly articulated in the conclusion.

Dr. Neuhouser suggested that because the message to the public is about coffee, there should be another caution about added sugars. Dr. Nelson responded that a major implication is caution for the milk, cream, and added sugar added to coffee. In addition, SC 5 shares the concern about the message being that 400 milligrams of caffeine is needed to achieve health benefits. It will be clear when the evidence is referring to coffee rather than caffeine.

Dr. Story suggested that SC 5 review if the data can separate the effects of coffee versus caffeine in regard to health outcomes. Dr. Hu shared that it depends on what health outcomes are being reviewed. For T2D there is clear evidence that it is another component of coffee other than caffeine. This distinction cannot be made for CVD or cancer. When focusing on neurodegenerative diseases the effect may be just from caffeine, which is a stimulant, and may have neuro-protective effects. The public health messaging has to be cautious.

Dr. Campbell shared that there was no mention of habitual or addictive caffeine intake. The Committee should carefully consider the conclusions given the public knowledge that caffeine is addictive, yet avoidance can lead to withdrawal symptoms. If the science promotes a level of coffee or caffeine to consume that is higher than normal consumption, then the public may increase caffeine consumption. Dr. Hu stated that SC 5 is not promoting coffee or caffeine consumption. The implication states that moderate coffee or caffeine consumption can be part of a healthy diet along with regular physical activity and not smoking. Dr. Campbell reiterated that the distinction between coffee and caffeine was not clear. Dr. Lichtenstein stated that SC 5 will work on the implications and suggested that the caffeine added in other foods would also be addressed in the implications. Dr. Nelson stated that SC 5 will take the suggestions and work on clear statements.

High-dose Caffeine

Dr. Hu presented an update on SC 5's evaluation of the relationship between high-dose caffeine consumption and health. He described the analytic framework emphasizing that the exposure for the studies was energy drinks since they can contain high amounts of caffeine. Two systematic reviews were included on energy drinks and health outcomes.

Dr. Hu reported the key findings on high-dose caffeine and health outcomes. All studies that measured BP found no change in BP with energy drink volumes of 250-500 milliliters, with variable caffeine concentrations. Other outcomes, including heart rate, arrhythmias, blood glucose and fatty acids, body composition, and aerobic endurance, were inconsistent across studies. Two studies examined energy drinks with alcohol and reported different outcomes. One study reported a decrease in motor coordination and visual acuity in healthy young men while

the other study reported no effects on arrhythmias within six hours of ingestion in healthy young adults. The limitations to the body of evidence included a lack of homogeneity across studies, including the type of intervention, dosage, and energy drink type, making comparisons difficult. Overall, studies investigating long-term consumption of energy drinks were lacking.

Dr. Hu shared position statements and evidence from the American Academy of Pediatrics (AAP), the Food and Drug Administration (FDA), and the CDC. The AAP and partners issued a position statement on energy drinks and advised no or limited consumption among children and adolescents. The FDA determined that caffeine added to alcoholic beverages was not generally recognized as safe (GRAS), leading to withdrawal of premixed, caffeinated alcoholic beverages from the market. In addition, the CDC issued a position statement on the dangers of mixing alcohol and energy drinks: 1) Energy drinks mask the depressant effects of alcohol; 2) Energy drinks have no effect on the metabolism of alcohol by the liver; and 3) Energy drinks result in an “awake” state of intoxication, increasing risk of alcohol-related problems.

Dr. Hu presented the draft conclusion statements on high-dose caffeine. “Studies examining the health effects of excessive caffeine intake were limited in both adults and children. Some evidence linked energy drinks to certain adverse outcomes, such as caffeine toxicity and adverse cardiovascular events. Randomized clinical trials that examined the association of energy drinks with cardiovascular and other health outcomes found mixed results. Few studies have evaluated the health effects of mixing alcohol with energy drinks, but they suggest energy drinks may mask the effects of alcohol intoxication and increase risk of alcohol-related problems.”

Dr. Hu then reported draft high-dose caffeine implications. Early safety signals consisting of case reports of adverse events associated with high-caffeine energy drink consumption, including increased emergency room visits, indicate a potential public health problem. Caution is warranted for the consumption of high-caffeine energy drinks for vulnerable populations, such as youth and adolescents. Energy drinks with high levels of caffeine and alcoholic beverages should not be consumed together, either mixed together or consumed at the same sitting. This is especially true for vulnerable populations.

Research recommendations for the topic of high-dose caffeine were presented. Research is needed to define excessive caffeine intake and safe levels of consumption for children and adolescents. More data on the prevalence of excessive caffeine intake in children and adults beyond intake of energy drinks are needed. Prospective studies of associations of excessive caffeine and energy drink intake with health outcomes in children and adults are necessary, as randomized controlled trials may not be feasible given ethical constraints. More research examining the health effects of alcohol mixed with energy drinks is needed.

Discussion

Dr. Campbell asked, regarding the draft conclusion statement about energy drink interaction with alcohol, if energy drinks may mask the effects of alcohol intoxication if individuals do not become intoxicated. Dr. Hu responded that a person is intoxicated but may not feel the effects of the alcohol. Dr. Campbell suggested that the wording be adjusted to be clear on this point.

Dr. Story asked if the subcommittee looked at pregnancy. Dr. Hu responded they did not. Dr. Story also asked if the subcommittee looked at excessive caffeine through energy drinks. Dr. Hu responded they did.

Dr. Abrams shared that a controlled trial would need to be done on animals in order to study effects on children. The studies could not be done with children because of ethical concerns. Dr. Hu stated that trials can be done on adults and agreed that energy drinks are not recommended for children.

Dr. Story asked if caffeine will be evaluated in women who are pregnant. Dr. Nelson said “normal” coffee/caffeine/pregnancy is being reviewed, but the “normal” caffeine level for pregnant women is lower than that for the general population.

Dr. Nelson asked the Committee if the second bullet of the implications, “Caution is warranted for the consumption of high-caffeine energy drinks for vulnerable populations, such as youth and adolescents,” should be stronger. Dr. Abrams responded that stronger wording is recommended for this population.

Dr. Neuhouser stated that a case report is not a study design and the evidence would be interpreted as weak. There will not be a randomized trial on this topic, but she said she understands the need to have a strong statement. Dr. Nelson suggested a precautionary principal be used here since there is no evidence it is safe or harmful.

Dr. Pérez-Escamilla asked if energy drinks fall under FDA regulations. Dr. Hu answered they are supplements and do not. The amount of caffeine can range from 50 to 600 milligrams per can in energy drinks, a problem for children.

Dr. Lichtenstein suggested specifying what “vulnerable populations” are. Dr. Nelson stated that the populations will be defined, and Dr. Neuhouser suggested that the Science Review Subcommittee could review this topic.

Dr. Story asked if SC 5 is considering a recommendation that caffeine be added to the food label. Dr. Hu responded that FDA is considering this. Energy drinks can have major public health consequences. He added that FDA has upper limits on caffeine in sodas, but there are not any for energy drinks. Dr. Lichtenstein reminded the subcommittee that many foods (e.g., candy bars) are available with caffeine added. Dr. Nelson said that ‘energy shots’ could be added to the statement.

Aspartame

Dr. Abrams presented an update on the subcommittee’s evaluation of the relationship between aspartame consumption and health. The evidence was based on an expert report from the European Food Safety Authority (EFSA) Panel Report: *Scientific Opinion on the Re-evaluation of Aspartame as a Food Additive* published in 2013. He reported the key findings that involved

human studies from the EFSA report. Overall, intakes of aspartame are not associated with an increased risk of adverse outcomes in populations who do not have phenylketonuria (PKU). Some concern requiring further investigation exists for some cancers, especially hematopoietic ones; however, the data do not clearly identify a relationship. Intakes amongst the higher exposure groups during pregnancy could be associated with preterm delivery and requires further evaluation and research.

Dr. Abrams then presented the draft conclusion statements on aspartame and health. “The Committee concurs with the EFSA Panel on Food Additives that aspartame in amounts commonly consumed is safe and poses minimal health risk for healthy individuals without PKU. This includes risk of most cancers, seizures, and cognitive/behavioral problems in children and adults. Limited and inconsistent evidence suggests a possible association between aspartame and risk of hematopoietic cancers (non-Hodgkin lymphoma and multiple myeloma) in men, indicating the need for more long-term studies. Limited and inconsistent evidence indicates a potential for risk of preterm delivery, although the risk is likely to be small. Very limited evidence does not allow for any conclusion on the relationship between aspartame consumption and headaches.”

Draft implications and research recommendations were reported. Individuals should be encouraged to stay at or below the aspartame acceptable dietary intake (ADI) of no more than 50 milligrams per kilogram per day. Further investigation is necessary regarding the risks of aspartame related to some cancers, especially hematopoietic ones, and pregnancy outcomes.

Discussion

Dr. Story asked if the conclusion means that aspartame is recommended for children. Dr. Abrams responded that based on available evidence there is no health risks for children, adding it would be hard to do clear toxicity studies.

Dr. Campbell asked where the population falls within regular intakes relative to the ADI of 50 milligram per kilogram. Dr. Abrams shared that there is approximately 180 milligrams per 12 ounces of diet soda and 30 to 40 milligrams per packet of aspartame sweetener. Dozens would be needed to be consumed in order to exceed 50 milligrams per kilogram as an adult.

Dr. Lichtenstein asked if the 50 milligram per kilogram of body weight per day suggest an obese person could consume twice the recommended amount. Dr. Abrams responded that most nutrient requirements are made on a body weight basis for children but not adults. However, SC 5 will need to take a closer look at the modeling that was done. Dr. Lichtenstein noted that the implications statement needs to point out that there is uncertainty. Dr. Abrams said that the population intake level is well below the ADI. Dr. Hu asked if the number could be removed and if a more generic phrase be used instead, “The usual intake in the population is considered safe.” Dr. Abrams suggested that the number not be taken out since it is used in European and U.S. guidance, and suggested instead to add cautionary text. Dr. Nelson answered that it can be noted that the current intakes are well within this range, to put this into context.

Dietary Patterns and Sustainability

Dr. Nelson presented an update on the topic of dietary patterns and food sustainability. She showed the analytic framework and described the inclusion/exclusion criteria. She then presented the evidence review. The study designs are predominately based on modeling. The exposure included dietary patterns such as the Mediterranean diet, vegetarian diet, dietary guidelines-related diet, and average American diet. The outcomes examined were health and environmental outcomes. Dietary patterns were assessed by *a priori* diet indexes related to health. Sustainability outcomes of interest included lifecycle assessment, environmental footprint, and food security.

Dr. Nelson reported the draft dietary patterns and sustainability key findings. A diet should be considered in its entirety when assessing environmental impact. The studies were consistent in showing that, in general, higher consumption of animal-based foods was associated with a greater impact on the environment. The studies were consistent in showing that healthier dietary patterns that adhered to respective dietary guidelines were more environmentally sustainable than diets typically consumed by the population. Three studies assessed the economic cost of more sustainable diets and results were inconsistent.

Draft conclusions were presented. “Consistent evidence indicates that, in general, a dietary pattern that is lower in animal-based foods and higher in plant-based foods has a lesser environmental impact and at the same time is more health-promoting than the current average American diet. The evidence suggests that a more environmentally sustainable diet can be achieved by following the *2010 Dietary Guidelines for Americans* and other countries’ national guidelines. An environmentally sustainable diet can be achieved without excluding any food groups completely.”

Dr. Nelson then presented draft implications. Sustainability considerations provide a compelling additional rationale for following current dietary guidelines. The evidence supports the U.S. population moving towards the *2010 Dietary Guidelines for Americans* by increasing consumption of plant-based foods and decreasing animal-based foods. The extension of dietary guidelines to be more inclusive and consider environmental and sustainability issues is achievable because of the large overlap between the health and environmental outcomes. Evidence supports that a more sustainable diet also promotes health and vice versa. Promoting more sustainable diets will contribute to food security for present and future generations by conserving resources. This approach should be encouraged across all food sectors. Moving forward, care will be needed to be sure that the U.S. population has access to, and can afford, a more sustainable pattern of eating.

Discussion

Dr. Neuhouser stated the outcome variable “sustainability” is a complex variable to construct. She asked how sustainability was characterized across studies, and what kind of comparability existed. Dr. Nelson responded that regardless of which outcome was used for the sustainability and environmental piece, there was consistency across all studies. The Life Cycle Assessment (LCA) was used in most of the studies. Dr. Neuhouser said there may be measurement error (e.g., water consumption, energy consumption). Dr. Nelson said that the subcommittee will outline the methods clearly in the report. The field is mostly using LCA.

Dr. Millen asked if the modeling exercises were theoretical or actually measured. Dr. Nelson responded that the outcomes were the former. Dr. Story suggested that grading of the evidence is very important especially since the evidence is based on modeling. Dr. Nelson responded that initially the subcommittee had graded the evidence “Strong-Moderate,” and when the subcommittee looked closely at the modeling design and the consistency of findings, it was changed to ‘strong’ after discussion. SC 5 will discuss the grading further.

Dr. Anderson added, based on what was presented the previous day on animal products and dietary patterns, there is heterogeneity. The literature from SC 2 does not line up with what is presented here. The pattern shared yesterday included increased fish consumption with low-fat dairy products and a recommendation for less red and processed meat. She queried how the Committee should approach the sustainability findings. Dr. Nelson responded that SC 5 needs to look closer at the evidence. The meat category is driving this evidence. The data do not show that one section of meat is stronger than another. Dr. Anderson added that it depends on the analytical approach. Dr. Nelson stated that the Mediterranean diet, ovo-lacto-vegetarian, and U.S. *Dietary Guidelines* or guidelines used in other countries were used in these modeling studies. SC 5 will add more detail in the methods.

Dr. Campbell asked if the work will allow for assessing the magnitude of the effect so that a certain amount of change can be encouraged. He shared that it would be positive to have a message about moderate change since a perfect diet is unlikely. Dr. Nelson responded that some studies showed magnitude and that SC 5 will try to include this. Dr. Campbell asked if the research identifies the major factors from farm-to-fork to evaluate opportunity for the largest impact. Dr. Nelson responded that SC 5 would look more into the impact.

Dr. Nelson shared that if SC 5 had more time, they would like to look at some new literature in motivating young adults to eat more healthfully and that a green message can be a more motivating factor. It is not out of context from what is already recommended in the *Dietary Guidelines*. Dr. Campbell agreed and recommended the Committee include what individuals and community groups can do to have an impact.

Dr. Pérez-Escamilla suggested that to ‘just consume more plant-based products’ is part of the issue and wondered if they are being produced in a more sustainable manner. Dr. Nelson responded that although sustainable agriculture is important, it is out of scope of this Committee.

Dr. Pérez-Escamilla suggested not using the term “life cycle.” Dr. Nelson responded that this is the agreed-upon terminology in the field, but the Committee will clarify the meaning of ‘life cycle’ in the report.

Dr. Lichtenstein suggested to reword the inclusion statement to say “a dietary pattern characterized by the 2010 *Dietary Guidelines*.” Dr. Nelson agreed.

Dr. Hu commented that there is a convergence of health and environmental issues and that the science is strong for combining them.

Dr. Nelson noted that current dietary intake patterns of Americans are not healthy and not sustainable. Dr. Lichtenstein suggested being careful about generalizing, because plant-based foods can be less desirable choices too. Dr. Nelson shared that high calorie snacks and sweets were removed because the evidence is limited, but if those products are reduced, it results in a lower environmental imprint.

In conclusion, Dr. Nelson shared the next steps for SC 5 which included: 1) Complete chapter background and conceptual model; 2) Finalize the update to the 2010 behaviors for preventing foodborne illness; 3) Conduct a specific NEL systematic review on caffeine and pregnancy; 4) Complete the question on fish sustainability in relation to dietary guidance; 5) Identify research gaps for the sustainability questions; and 6) Finalize writing of the chapter.

Subcommittee 3 (SC 3): Diet and Physical Activity Behavior Change

Dr. Rafael Pérez-Escamilla, SC 3 Chair, began by acknowledging the other members of SC 3, Dr. Wayne Campbell, Dr. Steven Clinton, Dr. Anna Maria Siega-Riz, Dr. Lucile Adams-Campbell, Dr. Michael G. Perri (consultant member), and Dr. Barbara Millen, the Committee Chair. Dr. Pérez-Escamilla discussed the scope of SC 3 which was previously shared in detail at the January and March 2014 meetings. SC 3 is focused on motivators, facilitators, and barriers to dietary and physical activity behaviors and interventions to improve adherence to dietary and physical activity recommendations. Dr. Pérez-Escamilla highlighted acculturation, eating out, and mobile health (mHealth) as the key topic areas to be discussed at the meeting and briefly reviewed the questions to be addressed.

Consultant SC Member

Dr. Michael G. Perri, Dean, College of Public Health and Health Professions and The Robert G. Frank Endowed Professor of Clinical and Health Psychology, University of Florida

Acculturation

Dr. Pérez-Escamilla began with the first topic, acculturation and gave the working definition for the term. The analytical framework, inclusion/exclusion criteria, and literature results were presented on six main questions including the relationship between acculturation and 1) measures of dietary intake; 2) body weight; 3) risk of CVD; 4) risk of T2D; 5) prevalence of

breast, prostate, lung, and colon cancer and total cancer mortality; and 6) risk of adverse pregnancy outcomes.

Dr. Pérez-Escamilla then presented the description of the evidence for the first question on the relationship between acculturation and measures of dietary intake. Draft key findings were presented. The draft conclusion statement stated: “Limited evidence from cross-sectional studies suggests that in adults of Latino/Hispanic national origin, particularly women and those of Mexican origin, higher acculturation to the U.S. is associated with lower fruit and vegetable intake, as well as higher intake of fast foods and sugar-sweetened beverages. Insufficient evidence was available among Asians in general, those of diverse Latino/Hispanic national origins, and for other ethnic groups regarding the association between measures of acculturation and dietary intake and that insufficient evidence is available in children” (DGAC grade: Limited).

Dr. Pérez-Escamilla provided the description of the evidence for the second question on the relationship between acculturation and body weight. Draft key findings were presented. The draft conclusion statement stated: “Limited evidence suggests that there is a relationship between higher acculturation to the U.S. and body weight status. This relationship may vary by national origin and gender” (DGAC grade: Limited).

Dr. Pérez-Escamilla discussed the description of the evidence for the third question on the relationship between acculturation and risk of CVD. Draft key findings were presented. The draft conclusion statement stated: “There is limited evidence from a small number of cross-sectional studies conducted in Latino/Hispanic populations suggesting a positive relationship between language acculturation and elevated blood lipid levels and no relationship between acculturation and blood pressure. Insufficient evidence was available for other race/ethnic populations and among children for these outcomes and other CVD outcomes” (DGAC grade: Limited).

Dr. Pérez-Escamilla then provided the description of the evidence for the fourth question on the relationship between acculturation and T2D. Draft key findings were presented and it was determined that conclusions regarding the relationship between acculturation and T2D could not be drawn. This was due to limited evidence from a very small number of cross-sectional studies and study populations, and limitations in acculturation assessment methodology, effect modifiers, and outcomes measured (DGAC grade: Not Assignable).

Dr. Pérez-Escamilla ended the acculturation presentation with draft research recommendations and a draft implications statement on acculturation and dietary intake, noting that acculturation provides important information about dietary habits, risk of excessive body weight, and cultural aspects including language preferences. It was noted that acculturation research has important implications for *Dietary Guidelines* dissemination and implementation.

Discussion

Dr. Lichtenstein inquired if age was included as an effect modifier. Dr. Pérez-Escamilla responded that this was important and needed to be included. Dr. Lichtenstein shared her surprise with the data showing increased sugar-sweetened beverage consumption after coming to the U.S. Dr. Pérez-Escamilla replied that a number of the studies were conducted before there was a large increase in sugar-sweetened beverage intake and obesity rates in other countries. Dr. Pérez-Escamilla also noted that the acculturation outcome may be different depending on where someone moved from and where they moved to (i.e., city vs. rural location, etc.).

Dr. Anderson noted there were not a lot of studies on this topic. Given the heterogeneity in acculturation measurement, a sensitivity analysis could be informative. Dr. Pérez-Escamilla noted that it would be important to invest in this type of research. He shared that people generally follow four different pathways when acculturating: 1) Give up their mother culture and adopt the American culture quickly; 2) Do not assimilate at all and do not learn the language or the host culture; 3) Lose their mother culture and do not adopt the new culture; or 4) Keep the language of the mother culture and successfully integrate into host culture (best outcome). Dr. Pérez-Escamilla felt these questions could be better answered once the measurements are refined further.

Eating Out

Dr. Campbell presented on the eating out topic area and addressed the question, “What is the relationship between eating out and/or take-away meals and body weight in children and adults?” Dr. Campbell noted that this work was a systematic review to update the 2010 Dietary Guidelines Advisory Committee question exploring the impact of eating out in a range of food outlets and evaluated by age group. The main outcomes evaluated were incidence of healthy weight, overweight, and obesity.

Dr. Campbell provided the analytical framework, inclusion/exclusion criteria, and literature results for the topic area. The description of the evidence and exposure in children and adults were discussed, noting that one study evaluated the transition from adolescence to adulthood.

Dr. Campbell discussed the strength of associations in the studies, noting that in adults most studies showed a positive association between frequency of eating out and higher body weight. The results were more mixed in children with one study showing an inverse association. The one study that evaluated adolescents transitioning to adulthood found a positive association between frequency of eating out and higher body weight.

Dr. Campbell finished his presentation discussing the next steps and items under development, including key findings and conclusion statements which will be presented at the September meeting.

Discussion

Dr. Lichtenstein inquired whether SC 3 could factor in things like income level and socioeconomic status which may be other factors associated with eating out. Dr. Campbell responded that SC 3 will work to make those comparisons and other potential modifiers (gender, etc.).

Dr. Nelson asked if the tables shown included the search that was done by the 2010 Dietary Guideline Advisory Committee. Dr. Campbell responded they did include that search.

Dr. Nelson inquired if there was any utility in also looking at calories of meals from quick serve versus casual dining and noted there can be misperceptions. She went on to say that fast food may be more portion controlled (especially with kids meals) compared to casual dining. She suggested it would be good to know the calories of the average kids meal at fast food establishments to provide some contextual background. Dr. Campbell shared his appreciation for the comment and noted that SC 3 would take that into consideration.

Mobile Health (mHealth)

Dr. Pérez-Escamilla then presented on mHealth, the final topic area discussed for SC 3. Two questions were addressed: 1) “What is the relationship between use of mHealth technology (e.g., cell texting, i-phones/tablets apps) alone or in combination with traditional group sessions or face-to-face counseling, and dietary behaviors (foods, food groups, dietary quality indices, and macronutrient intakes and proportions)?;” and 2) “What is the relationship between use of mHealth technology alone or in combination with traditional group sessions or face-to-face counseling and body weight?”

Dr. Pérez-Escamilla provided some background on mHealth and noted the topic area is a potentially powerful way to reach traditionally underserved populations. The analytical framework, inclusion/exclusion criteria, and literature results were presented. An overview of the studies and summary of the outcomes was provided.

Dr. Pérez-Escamilla shared draft research recommendations which included studying the extent of long-term impact of mHealth technologies and studying attrition as an outcome to understand factors of adherence and compliance. He stated that since the mHealth studies overlapped with the included articles for the self-monitoring topic, the SC 3 was planning to further evaluate the identified articles within the self-monitoring topic.

Discussion

Dr. Millen noted that most of the literature identified is on mHealth as the primary intervention rather than in combination with more traditional behavioral interventions such as face-to-face, telephone, etc. She asked if this is the direction this literature is going. Dr. Pérez-Escamilla responded that with different outcomes, you cannot replace face-to-face interventions with this technology; however, mobile technology is a tool and can be used if based on sound behavioral change approaches. He noted that he anticipates the next phase of research to evaluate how mobile technology is added to more traditional counseling and expressed interest in seeing more studies looking at the maintenance of changes in behavior.

Dr. Neuhouser noted that there may be an opportunity to use this technology given the wave of electronic medical records and suggested this may be a future research need. Dr. Pérez-Escamilla noted that he hopes more scientists in the nutrition field think about this approach which is currently very under-represented. Also, the concept of using electronic medical records could be used to tailor messages which could have a huge reach.

Dr. Lichtenstein shared that she sees two issues for future research; first, learning more efficacious ways of delivering information to individuals with high readiness to change and second, motivating individuals who are not as ready to change.

Dr. Hu commented that the FDA has approved an app for diabetes management and noted this type of technology will likely become main-stream in disease management and prevention.

Dr. Pérez-Escamilla shared that he sees two emerging trends, one with apps and a second with the ability for two-way communication for disease management, disease prevention, improving access, etc. He also mentioned he sees this as an area where Registered Dietitians can play a big role.

Dr. Nelson noted that there could be unintended consequences, such as people engaging with mobile technology and therefore spending more time sitting, and urged finding a balance to learn from successful interventions.

Dr. Pérez-Escamilla closed the presentation noting the other topics SC 3 is addressing, including self-monitoring, sedentary behavior and screen time in youth, household food insecurity, family/shared meals, sleep, and food/menu labeling.

Conceptual Model and Next Steps

Dr. Millen thanked the Chairs of the subcommittees, lead members of the working groups, and the support staff for their work. She highlighted the systematic, objective, and thorough approach the Committee is using for its review of the scientific evidence, noting that it is an extraordinarily intricate process. She mentioned that the conceptual model is under development by the Committee to address the complex set of determinants and influences on diet and physical activity behaviors and the relationships between those behaviors and health outcomes.

The model suggests that the complex influences and determinants of diet and physical activity lifestyle choices include the interpersonal and intrapersonal, environmental, sectors, settings, and systems levels of influence. The model links these determinants to health outcomes, including the nutritional status of the population and major causes of morbidity and mortality. The conceptual model addresses nutrition-related health outcomes through the lifespan which includes body weight and composition, risk factors and clinical indicators, and health outcomes such as obesity, T2D, and diet-related cancers. It takes into account the settings in which interventions may take place such as through health care and public health settings, and in the community through public-private partnerships. Understanding the complexity of these conditions and relationships between determinants and outcomes will provide context for the Committee's recommendations. Dr. Millen reviewed the DGAC and DGA timeline of past and future events. The Committee's goal is to submit its report by the end of calendar year 2014. After concluding her remarks, Dr. Olson adjourned the meeting.

Adjourned (2:49 p.m.)